


THE
JOURNAL
OF THE
BOMBAY NATURAL HISTORY SOCIETY.

EDITED BY
H. M. PHIPSON, C.M.Z.S.,
Honorary Secretary.



VOLUME IV.
1889.

CONSISTING OF FOUR NUMBERS AND CONTAINING
NINE ILLUSTRATIONS.



Bombay:
PRINTED AT THE
EDUCATION SOCIETY'S PRESS, BYCULLA.
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JOURNAL
OF THE
BOMBAY
Natural History Society

No. 1.] BOMBAY, JANUARY, 1889. [Vol. IV.

NESTING IN WESTERN INDIA.

BY LIEUT. H. E. BARNES.

(Continued from page 224.)

84.—THE WIRE-TAILED SWALLOW.

Hirundo filifera, Steph.

The Wire-tailed Swallow occurs throughout the district, but is nowhere numerically common ; it is a permanent resident, and breeds from the end of January to the end of May and again from the end of July to the beginning of October. The nest is deep, half saucer shaped, and is composed of pellets of mud, well lined with soft feathers, and is always placed in the vicinity of water, under the cornices of bridges, under arches of culverts, against the sides of wells, where there are projections under which they can build, in niches in buildings overhanging water, or under projecting ledges of rock. It is always placed against the side and a little below the roof or projection, only just enough space being left for the ingress and egress of the bird.

The eggs, three in number, are long narrow ovals in shape, a good deal pointed towards one end ; they average 0·72 inches in length by about 0·52 in breadth ; in colour they are white, beautifully speckled, spotted and blotched with various shades of reddish-brown. When fresh and unblown the ground colour is a delicate pink owing to the yolk showing through. They will not desert the nest even if the eggs be taken, but will lay a second, and if this be taken, even a third clutch in the same nest.

85.—THE MOSQUE SWALLOW.

Hirundo erythropygia, Sykes.

The Mosque Swallow occurs generally throughout Western India, but is more common in hilly districts (such as Mount Aboo), than in the open country. Most of them retire to the hills to breed about April, but a few remain, and nests are not unfrequently found in the plains. The nest, constructed of pellets of mud (which the bird procures from the banks of the nearest pond or river), is of a peculiar shape: it consists of a bulb-like chamber, five or six inches in length at one end, with a tubular passage, sometimes eight or nine inches long at the other, which the male continues to lengthen, even after the eggs are laid and while the female is sitting upon them. It has not inaptly, been described as retort or rather half-retort shape. It is usually affixed to the roof of a cave, under a bridge or culvert, or to the under surface of a projecting ledge of rock.

The nest is well lined with soft feathers, and the eggs, three in number, are pure unspotted white, of a longish oval shape, and average 0·78 inches in length by 0·55 in breadth.

After the birds have once selected a site for their nest, they are very difficult to drive away. I have often broken open nests to see if any eggs had been laid, and they have always been repaired, and I have eventually obtained eggs from them. To such an extent is the constructive faculty developed in these birds, that they often make two or more nests before they are satisfied, and they are known to make a winter residence, in which eggs are never found. They are solitary breeders.

86.—THE INDIAN CLIFF SWALLOW.

Hirundo fluvicola, Jerd.

The Indian Cliff Swallow is not uncommon in some parts of the Deccan, but is somewhat locally distributed; it occurs at Satara and Sholapur in some numbers; near Aboo and Decsa it is very rare; but at Ahmedabad there are several colonies; it is common but local in Nassick and Khandeish, and occurs at Baroda. It has not been reported from Sind. They are generally permanent residents where found; breeding twice in the year, from February to April, and again in July, August and the early part of September.

They build retort-shaped nests of mud, but very different to those of the Mosque Swallow, the bulb or chamber portion being affixed to the under-surface of a shelving rock, or under a bridge, with the

tubes hanging down, or rather a little outwards, the whole looking not unlike a huge honeycomb. These clusters of nests are often of great size, containing from 30 to 200 nests, and are almost always in the immediate vicinity of water.

The nests are well lined with feathers; the eggs, three in number, are longish ovals in shape, and average 0·76 inches in length by about 0·53 in breadth. They are of two different types. In one they are pure unspotted white; in the other, they are more or less speckled, spotted or streaked with yellowish-brown; these markings are not clearly defined. The nests, especially the outer ones of a cluster, are often appropriated by Common Swifts and House Sparrows.

89.—THE INDIAN SAND MARTIN.

Cotyle sinensis, J. E. Gr.

The Indian Sand Martin is common in suitable places in most parts of Western India, but has not as yet been recorded from Ratnagiri. It is a permanent resident, breeding from November to March, or even later.

They bore holes in the sandy banks of rivers to a depth of from eighteen to forty or fifty inches, according to the relative hardness of the soil; and at the end of this hole or passage, which is enlarged, they make a slight nest of fine grass roots lined with soft feathers. The eggs, three in number, are pure white, quite devoid of gloss; they are oval in shape, and measure 0·68 inches in length by about 0·48 in breadth.

The nest holes are not solitary, but they are much more scattered than is usually the case with the British species.

90.—THE DUSKY CRAG MARTIN.

Cotyle concolor, Sykes.

The Dusky Crag Martin, with the exception of Sind, occurs more or less abundantly throughout our limits. It is somewhat solitary in its habits, rarely more than a single pair nesting in the same vicinity.

They have at least two broods in the year, and lay at different seasons in different parts of the country, but from January to March and from July to September are perhaps the best times to search for eggs. The nest is placed under a projection in the face of a rocky cliff, far from the haunts of man, or under the eaves of a house in his very midst. It is very like that of the Wire-tailed Swallow, but is

smaller, more cup-shaped and pointed at the bottom, but like it is well lined with feathers. The eggs, three in number, are white with numerous spots and specks of various shades of yellowish or reddish-brown, but these markings are neither so bright nor so bold as those of the Wire-tailed Swallow; they average about 0·72 inches in length by nearly 0·52 in breadth. They appear to build in the same place for successive seasons, and do not desert the nest when robbed, but lay again within a fortnight or even less.

98.—THE ALPINE SWIFT.

Cypsellus melba, Lin.

The Alpine Swift occurs not uncommonly in mountainous tracts throughout the district, descending to the plains during the day but returning at night to roost. It is possessed of amazing powers of flight, and covers vast distances daily in search of food.

Its breeding haunts were long unknown, but it has now been ascertained to breed in the mountainous tracts of Nassick,* and will doubtless prove to do so in most other suitable places; they breed in deep clefts and fissures of almost inaccessible rocks; the nest is a very solid structure in comparison with that of the Common Swift; it is shallow, and is usually fastened to both sides of the fissure, which often stretches upwards into an overhanging cliff, and it is a most difficult nest to take. They do not seem to breed at any particular season, but eggs have been taken early in February.

Mr. Littledale found a colony of about eighteen nests in the face of a smooth overhanging crag in Dutchkut, Cashmere, but they were quite inaccessible.

Nassick, February.

J. Davidson, C.S.

100.—THE COMMON INDIAN SWIFT.

Cypsellus affinis, J. E. Gr.

The Common Indian Swift is abundant throughout the district, and is a permanent resident; it has several broods in the year, and eggs and young may be found at all seasons.

They are very accommodating in the choice of nesting sites. Nests may be found in any of the following situations:—

In holes in the faces of old walls, mosques, forts, or other old buildings; in these cases the nests are detached, unless the hole happens to be large enough to contain two or more.

* Vide B. N. H. S. Journal, p. 47, No. 1, Vol. III.

Under the eaves of houses, tombs, &c., several nests together, with perhaps a few detached ones.

In the doorways and under roofs of stables and other outhouses, or between closely-set rafters.

Under the roofs of caves they occur in clusters; often containing fifty or more nests, with isolated ones, or small clumps of two or three in close proximity to the central mass.

Their nests, which take a long time to construct, are composed of agglutinated saliva, mixed with a few feathers and straws; they are of no particular shape, but if in a hole or other confined place, it necessarily takes its shape; they are at times long and narrow, occasionally almost round, but generally they are of an irregular oblong shape.

The entrance is a portion of the upper part of the nest left unfinished.

The eggs, three in number, are long narrow ovals, measuring 0·78 inches in length by 0·57 in breadth. They are pure glossless white, with a pinkish tinge when fresh and unblown.

As previously noted they often appropriate nests of the Cliff Swallows.

102.—THE PALM SWIFT.

Cypsellus battassiensis, J. E. Gr.

The Palm Swift is most abundant in those districts in which the toddy palm abounds, but where these trees are absent, the Palm Swifts are absent also.

They breed twice a year, from March to July; the nest is almost always placed in a furrow formed by a plait in the under-surface of a bent palm leaf towards the centre. It is a tiny watch pocket in shape, composed of vegetable down, often mixed with feathers (parrots' and doves' especially), and is cemented to the leaf by agglutinated saliva; the nest itself is soft, but the upper edge is hard and cordlike. The eggs, three in number, are perfect miniatures of those of the Common Swift, measuring 0·7 inches in length by about 0·46 in breadth.

Bombay, May.

H. E. Barnes.

103.—THE EDIBLE NEST SWIFTLET.

Collocalia unicolor, Jerd.

The Edible Nest Swiftlet occurs on the Malabar Coast, breeding during the months of March and April. The nests, composed of

inspissated saliva, are half saucer-shaped, and are affixed to the sides of rocky caves, in small clusters, but detached nests are not unfrequent. The eggs, two or three in number, are, as a rule, long narrow ovals in shape, measuring 0·83 inches in length by about 0·54 in breadth; in colour they are dull glossless white.

Nests of the first make are white, and are very valuable; those of the second are not so clear, and are mixed with extraneous matter, and do not command so high a price in the Chinese markets as the others. Nests of the third make (which are left for the birds to breed in) are discoloured and are much mixed with feathers, straws, &c., and are of no commercial value. The right to collect the nests is sold annually by Government, but the revenue derived from it is very insignificant.

Vingorla, Feb. and April.

G. Vidal, C. S.

104.—THE INDIAN CRESTED SWIFT.

Dendrochelidon coronata, Tick.

The Indian Crested or Tree Swift is not uncommon at Ratnagiri, and occurs rarely all along the Western ghats. It has been recorded from Mhow and from the hilly jungles of the Panch Mahals. It is not uncommon in the broken hilly land below the ghats and along the plain forest south of the Satpooras. It is a permanent resident where found, breeding from April to June. The nest, which is small, is a shallow half-saucer in shape, no larger than a rupee, and is composed of thin flakes of bark, glued by the bird's own saliva to the dead branch of a tree. It is about half an inch in depth, and is nowhere more than one-eighth of an inch in thickness. The egg, there is only one, is oval in shape, measuring 0·9 inches in length by 0·57 in breadth, and is dull glossless white in colour.

The nest is easy to find, as the cock-bird, while the hen is sitting for most of the day, keeps flying within a hundred yards of the nest. He continually calls and is answered by the female from the nest, which is generally on a thin bare branch, from eight to twenty feet from the ground.

Panch Mahals, May.

H. Littledale, Esq.

Western Khandesh, Feb. to April.

J. Davidson, C.S.

107.—THE JUNGLE NIGHT JAR.

Caprimulgus indicus, Lath.

The Jungle Night Jar is not uncommon on the Western ghats, and occurs also on the Aravelli Range. It breeds from March to the middle of May, making no nest, but depositing its two eggs in a slight depression on the bare ground under the shelter afforded by a low bush. They are oval in shape, measuring 1·2 inches in length by about 0·88 in breadth; in colour they are a pale salmon pink, thickly blotched and streaked with purplish and olive brown.

*Nussick, April and May.**J. Davidson, C.S.*

108.—THE NILGIRI NIGHT JAR.

Caprimulgus kelaarti, Bly.

The Nilgiri Night Jar has been recorded from the Konkan; it is only doubtfully distinct from the Jungle Night Jar, *C. indicus*, and might with advantage be suppressed. The eggs are exact facsimiles of those of the latter bird.

*Nilgiri, in Coll.**H. E. Barnes.*

111.—THE GHAT NIGHT JAR.

Caprimulgus atripennis, Jerd.

The Ghat Night Jar has been recorded from the forest tract west of Belgaum, and Jerdon mentions it from the Malabar Coast. As usual with all the Night Jars, it lays two eggs on the bare ground. They are of a dark salmon colour, spotted and blotched with purplish and reddish-brown; they measure 1·1 inch in length by about 0·73 in breadth.

*S. India, in Coll.**H. E. Barnes.*

112.—THE COMMON INDIAN NIGHT JAR.

Caprimulgus asiaticus, Lath.

The Indian Night Jar is common throughout the district, and is a permanent resident, breeding from March to September, but most eggs will be found in June and July. It is common in scrub jungle, but is rare in deep forest. The eggs (there is no nest) are two in number, and are laid on the bare ground. They vary from a warm pinkish stone colour to a deep salmon pink, and are clouded, blotched, and streaked with different shades of pale reddish and purplish-brown. They measure 1·04 inches in length by 0·77 in breadth.

*Deesa, &c., April and May.**H. E. Barnes.*

113.—SYKES' NIGHT JAR.

Caprimulgus mahrattensis, Sykes.

Sykes' Night Jar is very common in Sind, where it is a permanent resident, but becomes much less common towards the South. It breeds from February to August, laying its two eggs in a depression on the ground, occasionally in the open, at other times under a tussock of grass or clod of earth. They are of a light pale stone or clayey colour, with large blotches and clouds of neutral tint. They measure 1.15 inches in length by about 0.8 in breadth.

Hyderabad (Sind), 18th April to 5th May. H. E. Barnes.

Eastern Narra (Sind), Feby. to August. S. Doig, Esq.

114.—FRANKLIN'S NIGHT JAR.

Caprimulgus monticolus, Frank.

Excluding Sind, Franklin's Night Jar is more or less commonly distributed throughout the district, breeding in the manner usual with the genus, from April to July. The eggs are of a deep salmon colour, exactly similar to that of the Jungle Night Jar, but the eggs are much larger; they are spotted and blotched with pale purplish and clayey-brown. They average 1.2 inches in length by nearly 0.83 in breadth.

Mount Aboo, June. H. E. Barnes.

Neemuch, June and July.

Nassick, April to June. J. Davidson, C. S.

117.—THE COMMON INDIAN BEE-EATER.

Merops viridis, Lin.

The Common Indian Bee-eater is most abundant throughout the entire district.

They breed in April in holes in sandy banks of nullahs, in the sides of cuttings, and occasionally in almost level ground.

They cut a fresh hole each season, using their bills to loosen the earth, and scraping it away with their claws. The holes vary in depth from two to four feet or more, according to the nature of the soil, and are barely two inches in diameter. They are cleanly cut and are quite circular, with two little channels made by the feet of the bird in entering and leaving the passage.

There is no nest. The eggs are laid on the bare ground, in a cavity or enlargement at the end of the hole. They are usually four in number, but sometimes six or seven are found. They are almost spherical in shape, measuring 0·78 inches in length by 0·7 in breadth. In colour they are milk-white, and are brilliantly glossy when fresh. They seem to lay their eggs at intervals, as very often fresh and incubated eggs or nestlings are found in the same nest.

118.—THE BLUE-TAILED BEE-EATER.

Merops philippinus, Lin.

The Blue-tailed Bee-eater occurs sparingly throughout the district, but appears to be more common in Gujarat, where it breeds during the hot weather in holes in the banks of rivers.* They also breed in Khandesh, making their nest-holes in the face of the Satpooras early in May.

The eggs are similar to those of the Common Indian Bee-eater but are larger, measuring 0·88 inches in length by 0·76 in breadth.

Baroda, May.

H. Littledale, Esq.

E. Narra (Sind), July.

S. Doig, Esq.

Khandesh, May.

J. Davidson, C.S.

123.—THE INDIAN ROLLER.

Coracias Indica, Lin.

The Indian Roller, more commonly known as the Blue Jay, is abundant throughout the greater part of the district. It is a permanent resident as a rule, but in some localities retires to the better wooded tracts to breed.

They build in holes in trees, in walls, under eaves of houses, &c. The nest is a mere collection of rubbish, such as rags, fibres, tow, &c., thrown together anyhow. The eggs, four in number, are glossy china-white, of a broad oval shape, occasionally almost spherical. They measure 1·3 inches in length by rather more than an inch in breadth.

The nesting season extends from April to July, but May and June are the months in which most eggs are laid.

Mr. Davidson has kindly furnished me with the following note : In the Satara, Poona, and Nassick ghats they are apparently absent during the hot weather, but breed abundantly in the Satpooras.

* Vide B. N. H. S. Journal, p. 32, No. 2, Vol. I.

127.—THE BROWN-HEADED KINGFISHER.

Pelargopsis gaurial, Pears.

The Brown-headed or Stork-billed Kingfisher is the least common of all the family, and only occurs as a straggler in most places of the district. It has not been recorded from Sind. Mr. Davidson, C.S., found it breeding in Nassick and West Khandesh in April and May in holes in river banks, generally about a foot deep. A female I shot in Neemuch in March had good sized eggs in her ovaries, and I have also received notes of nesting holes from other places.* The eggs are stated by Mr. Theobald to be four in number, in shape round and pure white. He gives the dimensions as 1.00 inches in length by 1.02 in breadth, but this is less than eggs of the much smaller White-breasted Kingfisher measure, and must, I think, be a mistake.

129.—THE WHITE-BREASTED KINGFISHER.

Halcyon smyrnensis, Lin.

The White-breasted Kingfisher is a common permanent resident throughout the entire region, breeding in holes pierced in the banks of rivers, canals, and tanks, and in the sides of wells, from March to the end of May and again in July and August. There is no nest. The eggs, from four to seven in number, are deposited in a cavity at the end of the passage; they are glossy china-white when first laid, but soon become discoloured. In shape they are very broad ovals, some being almost spherical; they average 1.12 inches in length by 1.03 in breadth.

I have never found the least semblance of nest, but Mr. Baker writing from Silchar, North Cachar, tells a very different tale. He says, *in epist.*:—“*Halcyon smyrnensis* always build their nests here of moss, and generally under an overhanging stone on the bank of some small stream, which is entirely covered in with jungle. The people here declare that it never makes a hole in a bank, and they do not consider it to be a Kingfisher, calling it quite a different name.” In another letter he says:—“I was halting on the bank of a river, some eight or ten miles from Guilong, and during the day noticed a pair of these birds constantly visiting a place under an old rotten tree. On my inspecting it I found that they had built, or rather nearly built, a nest in a crevice between two roots. It was composed of moss with a few skeleton leaves,

* *Vide* B. N. H. S. Journal, p. 32, No. 2, Vol. I.

and was in appearance like a Willow Wren's nest, only of course very much larger. I did not touch the nest as I wanted to watch the birds; so I fetched my glasses, and seated myself on a heap of stones about fifty yards away. One of the birds soon came back with a large piece of moss in its beak. This it commenced to jam in between the nest and the tree, hanging on to a root all the time and working most vigorously. There seemed to be no weaving or twisting, but the bird seemed to work the nest into shape as it went on. The nest when examined afterwards was found to consist of layers of moss, one on the top of the other. It fell to pieces directly it was pulled out, and I have not seen a single nest which had sufficient consistency to stand handling." Mr. Baker is a careful observer, and I feel certain that he has made no mistake.

This total change of habit is curious, and it would be interesting to learn if any other naturalist has met with a similar experience.

134.—THE INDIAN KINGFISHER.

Alcedo bengalensis, Gm.

The Indian Kingfisher is common throughout the district except in Sind, where it is replaced by the closely allied, even if distinct, European Kingfisher, *Alcedo ispida*. They breed during the hot weather in holes in the banks of rivers and streams. They make no nest, but a few small fish bones are generally found close to the eggs; but these are only castings, and are evidently not intended for a nest. The eggs, from five to seven in number, are glossy china-white (pinkish-white when fresh). In shape they are broad ovals, occasionally almost spherical. They measure 0·8 inches in length by 0·63 in breadth.

134 bis.—THE EUROPEAN KINGFISHER.

Alcedo ispida, Lin.

The European Kingfisher differs so slightly from the Indian form, that I do not consider the latter entitled to specific distinction, but until the question is definitely settled, it must be retained. The European Kingfisher is very common in Sind, where it is a permanent resident, breeding during the hot weather. The eggs are not distinguishable from those of the Indian bird.

(Hyderabad Sind), May and June.

H. E. Barnes.

136.—THE PIED KINGFISHER.

Ceryle rudis, Lin.

The Pied Kingfisher occurs in suitable localities throughout the presidency. It is a permanent resident, breeding during the summer months in holes in the banks of streams and rivers. The eggs, four to six in number, are glossy china-white, and are usually of a broad oval shape, but are liable to variation. They measure 1.15 inches in length by 0.9 in breadth.

There are three or four other species of this family mostly confined to the sea coast in the South. They are probably permanent residents, but I can find no record of their breeding.

140.—THE GREAT HORNBILL.

Dichoceros caratus, Shaw.

The Great Hornbill is a permanent resident in the forest clad portions of the Sahyadri range, where it is not uncommon. They feed principally on ripe berries and fruit, leaving their usual haunts during the winter in search of them. They kill and eat snakes when they find them.

They breed during the hot weather in holes in rotten trees. The female is a close sitter, closing up the entrance hole with her own ordure, only leaving a long narrow slit through which she obtrudes her bill to receive the berries and other food that her mate brings her. She does not leave the nest hole until the eggs are hatched out. The eggs, three in number, vary in colour from pure white to pale-yellow. They measure 2.7 inches in length by about 1.8 in breadth.

141.—THE MALABAR PIED HORNBILL.

Hydrocissa coronata, Bodd.

The Malabar Pied Hornbill is a not uncommon permanent resident in the southern portion of our district, but I cannot find any record of its breeding.

144.—THE COMMON GREY HORNBILL.

Ocyrceros birostris, Scop.

The Common Grey Hornbill has not been recorded from Sind, and only doubtfully so from the Deccan. Generally speaking it is not uncommon in all the well-wooded tracts of Rajpootana and Gujerat. In the Gir forest in Kattywar it is very common. It is fairly common in the mango groves in the Nassick and Khandesh districts. It

breed during April and May in the same manner as others of the family. The eggs, three to five in number, are dull-white, and are usually more or less discoloured. They are oval in shape, and measure 1·7 inches in length by about 1·22 in breadth.

Khandesh, April to May.

J. Davidson, C.S.

145.—THE JUNGLE GREY HORNBILL.

Tockus griseus, Lath.

The Jungle Grey Hornbill is more or less common in the forest-clad hills in the south of the district, occurring as far north as Khandalla.

It is a permanent resident, but I can find no record of its breeding within our limits.

147.—THE ALEXANDRINE PAROQUET.

Palæornis eupatria, Lin.

The Alexandrine Paroquet does not occur in Sind, and appears to be altogether absent from the South. It occurs and breeds on the Satpoora Hills, but is rarely seen on the Satmallis in the south of the district. I met with a large flock on one occasion only at Neemuch, Rajpootana. The greater number if not all of the young birds offered for sale in the Bombay market come from Central India from hills in the Jubbulpur district, where the birds are common. They breed in holes in trees very late in the year, nestlings being exposed for sale about Christmas. The eggs, four in number, are oval in shape, measuring 1·5 inches in length by about 1·15 in breadth.

They are white when first laid but soon become discoloured.

W. Khandesh, Nov. to January.

J. Davidson, C.S.

148.—THE ROSE-RINGED PAROQUET.

Palæornis torquatus, Lin.

The Rose-ringed Paroquet is a common permanent resident throughout the entire district, breeding generally in holes in trees, occasionally in holes in old walls and buildings, and under the eaves of outhouses. From the middle of February to about the middle of April is about the best time to search for nests. The eggs, four in number, are pure glossless white; they are oval in shape, pointed at one end, and measure 1·2 inches in length by about 0·95 in breadth.

149.—THE ROSE-HEADED PAROQUET.

Palæornis purpureus, P. L. Z. Mull.

With the exception of Sind the Rose-headed Paroquet occurs generally throughout the district, but is much less common and is more locally distributed than the Rose-ringed Paroquet. They retire to the hills about the end of March to breed, but on one occasion at Poona I saw nestlings exposed for sale on Christmas Day, which had been taken at Khandalla.

They nest in holes in trees. The eggs, four in number, are exact miniatures of those of *P. torquatus*, measuring an inch in length by 0·8 in breadth.

W. Khandesh, February.

J. Davidson, C. S.

Saugor, C. P., March.

H. E. Barnes.

151.—THE BLUE-WINGED PAROQUET.

Palæornis columboides, Vig.

Within our district the Blue-winged Paroquet is confined to the Sahyadri range. I can find no account of its nesting, but great numbers of young birds are exposed for sale in the Crawford Market, Bombay, every hot season. The dealers say they come from the ghats.

158.—THE SIND PIED WOODPECKER.

Picus sindianus, Gould.

This Woodpecker seems to be confined to Sind, where it is very common in suitable places. It is a permanent resident, breeding during March and April, laying its eggs in holes in trees, which are cut by the birds themselves.

The eggs, three in number, are glossy milk-white, and measure 0·85 inches in length by nearly 0·67 in breadth.

Hyderabad (Sind), March and April.

H. E. Barnes.

Eastern Narra (Sind), 2nd April.

S. Doig, Esq.

160.—THE YELLOW-FRONTED WOODPECKER.

Picus mahrattensis, Lath.

The Yellow-fronted Woodpecker is generally distributed throughout the district, but is rare in Sind, where it is replaced to a great extent by *P. sindianus*. It is a permanent resident, breeding during February, March and April in holes which it cuts in trees. There

is no nest. The eggs, three in number, are glossy milk-white ovals, shaded delicate pink when fresh and unblown. They average 0·87 inches in length by nearly 0·68 in breadth.

Deesa, March.

H. E. Barnes.

Nassick and Khandesh, Feb. to April.

J. Davidson, C. S.

Baroda, Feb. to April.

H. Littledale, Esq.

164.—THE SOUTHERN PIGMY WOODPECKER.

Yungipicus nanus, Vig.

The Southern Pigmy Woodpecker occurs sparingly all along the Sahyadri range, where it is a permanent resident, breeding during February and March. It is exclusively a jungle bird and rare, except in the broken country below the ghats.

In West Khandesh, where it is abundant, in one week in the beginning of March, Mr. Davidson, C.S., took twenty nests. They were almost all in thick branches, about 16 feet up a tree that had been pollarded for rabi cultivation, and with two exceptions all contained callow young on that date. It cuts a tiny hole in the side of a large branch of a tree, which is generally more or less decayed. There is no nest. The eggs, three or four in number, are glossy-white and measure 0·67 inches in length by 0·5 in breadth.

W. Khandesh, March, nestlings.

J. Davidson, C. S.

166 bis.—THE LARGE GOLDEN-BACKED WOODPECKER.

Chrysocolaptes delesserti, Malh.

The Woodpecker occurs not uncommonly all along the Sahyadri range and adjacent forests. It is a permanent resident, and of course breeds, but I cannot find any satisfactory account of its nesting. It is said to breed from December to February in large holes, which it cuts in trunks of trees, at various heights from the ground, laying but a single egg, which is glossy white and of a broad oval shape.

167.—THE BLACK-BACKED WOODPECKER.

Chrysocolaptes festivus, Bodl.

This very handsome Woodpecker has been recorded from Ratnagiri but is not common. It occurs, but very rarely on Mount Aboo and the adjacent hills. It is fairly common throughout the ghats, both in Nassick and Khandesh, also on the Satpooras. It cuts a very

large nest hole and breeds early, young, able to fly, having been found in the Satpooras at Christmas.

It generally lays but one egg, but Mr. Davidson, C. S., on one occasion obtained a young one and a rotten egg from the same nest (this was in March). It generally cuts several holes in the tree on which it nests, as well as in the adjacent ones.

175.—THE SOUTHERN YELLOW-NECKED WOODPECKER.

Chrysocolaptes chlorigaster, Jerd.

Occurs throughout the jungles in the Western Satpooras and in the northern part of the ghats, but is nowhere abundant. It is a permanent resident, but the eggs do not appear to have been taken.

179.—THE MADRAS RUFOUS WOODPECKER.

Micropternus gularis, Jerd.

The Madras Rufous Woodpecker occurs along the Sahyadri range and adjacent forests as far north at least as Khandalla. It is a permanent resident, but I can find no account of its nesting habits.

Several observers have noticed the fact of its head and tail being generally smeared with resin, and also its habits of hammering at ants' nests, in which most probably, like its northern congener, *M. phaeiceps*, it lays its eggs.

180.—THE GOLDEN-BACKED WOODPECKER.

Brachypternus aurantius, Lin.

The Golden-backed Woodpecker is very common throughout the northern half of the presidency. It is a permanent resident, breeding from March to July, cutting its nest-hole in the trunk of a tree, generally a mango or other soft-wooded one. The eggs, three in number, are oval in shape, somewhat pointed at one end. They measure 1.11 inches in length by 0.8 in breadth, and are glossy milk-white, with a delicate salmon tinge when fresh and unblown.

In the Deccan it appears to retire to the hills to breed.

Deesa, &c., April and May.

H. E. Barnes.

181.—THE LESSER GOLDEN-BACKED WOODPECKER.

Brachypternus puncticollis, Malh.

This Woodpecker replaces the last in the south. Its nesting habits are precisely similar.

182.—THE SIND GOLDEN-BACKED WOODPECKER.

Brachypternus dilutus, Bly.

This bird does not differ in any respect from *B. aurantius*, and has been rightly suppressed in most recent ornithological works.

There are several other Woodpeckers, occurring more or less rarely, on the forest-clad hills of Western India, mostly in the south. They are probably permanent residents, but of their nestings I can find no record.

193 bis.—THE WESTERN GREEN BARBET.

Megaloema inornata, Wald.

The Western Green Barbet is not uncommon in the Satpoor and Dang country below the ghats. It is very common at Aboo and in the jungles of the Panch Mahals. Many observers have reported it from the ghats, but there it is certainly less common than *M. viridis*. It does not occur in Sind. It is a permanent resident, breeding during March and April, drilling its nest-hole in a large branch of some soft-wooded tree.

The eggs, three or four in number, are dullish-white in colour, and measure 1·3 inches in length by about 0·9 in breadth.

Aboo, March to April.

H. E. Barnes.

Satpooras, March to April.

J. Davidson, C. S.

194.—THE SMALL GREEN BARBET.

Megaloema viridis, Bodd.

The Small Green Barbet within our limits seems to be confined to the Sahyadri range and adjacent forests.

It is a permanent resident, breeding from March to May, in the manner usual to all the members of the group. The eggs, three or four in number, are oval in shape, and measure 1·1 inches in length by 0·86 in breadth.

197.—THE CRIMSON-BREASTED BARBET.

Xanthoëma hæmacephala, P. L. Z. Mull.

The Cooper Smith is rare in Sind, but is very common in all other parts of the Presidency. It is a permanent resident, breeding from the end of February to about the middle of April. They select a branch which, however sound it may appear externally, is always decayed and hollow within. They cut a circular hole in this, and at

the bottom of the hollow, often a considerable depth from the opening, they deposit their eggs, making no nest. The eggs, three in number, are long narrow ovals measuring nearly an inch in length by about 0·7 in breadth. They are pure white.

199.—THE CUCKOO.

Cuculus canorus, Lin.

I can find no authentic record of an egg of the Cuckoo having been found within our limits, but I have no doubt of its breeding freely on Mount Aboo and other wooded hills in Western India as I, in common with other observers, have procured young birds that must have been bred in the vicinity. Mr. Davidson, C.S., says that old birds pass through Dhulia in Khandesh in June, at which time they call vigorously, and in the Satpooras in July a dozen may be heard calling in a morning. Again in August and September, numbers, both young and old, pass through Dhulia southwards, showing that they must have been bred in the Satpooras at that time.

203.—THE INDIAN CUCKOO.

Cuculus micropterus, Gould.

Is found throughout the ghats from May to August, and its metallic cry can be heard from a considerable distance. It is a shy bird and undoubtedly breeds at this time.

205.—THE COMMON HAWK CUCKOO

Hierococcyx varius, Vahl.

Is a permanent resident in the northern portion of Khandesh, and occurs in Nassick at the end of the hot weather and during the rains. It appears to lay frequently in the nests of the various Babblers, as eggs and young have been taken from them in the month of July by Mr. Davidson, C.S.

212.—THE PIED CRESTED CUCKOO.

Coccytes jacobinus, Bodd.

The Pied Crested Cuckoo is a monsoon visitant, and occurs more or less commonly throughout the district, but is much more abundant towards the north, becoming comparatively rare in the south. It breeds soon after its arrival, placing its egg as a rule in a nest of one of the *malucocerci*.*

* Capt. Sadler took an egg from a nest of *Iora zeylonica* during the rains at Baroda.

The eggs, I cannot say how many are laid, are glossy spotless blue in colour, darker or lighter in different specimens. They are roundish ovals in shape, measuring 0·94 inches in length by 0·73 in breadth.

The eggs can be distinguished from those of the Bush Babbler by their spherical shape, and from those of the other *Malacocerci* by their smaller size, but the only really authentic specimens are those extracted from the oviduct of the female. A single egg, as a rule, is laid in each nest, but Mr. Littledale once found two Cuckoo eggs and one Babbler's in the same nest, but this was an exception, and I am not aware of any other collector meeting with the same luck.

The eggs of the rightful owner of the nest are not destroyed by the parent Cuckoo, but as the young Cuckoo is the sole occupant of the nest, he probably makes away with his nest fellows as soon as they are hatched.

Mhow, October.

H. E. Barnes.

Deesa, June to August.

„

Hyderabad (Sind), August.

„

214.—THE KOEL.

Eudynamis honorata, Lin.

With the exception of Sind, where it is rare, the Koel is very common. It is usually a seasonal visitant only, but in some districts it appears to be a resident. They lay their eggs in the nests of the Common Crow, usually one in a nest, occasionally two, but I once found three, but as these eggs differ from each other, they were probably the produce of different birds. Mr. Davidson, C. S., on one occasion found four eggs in a crow's nest, evidently from the markings the eggs of two birds, but this was late in the year, after the Koel's eggs had been persistently taken, and the number of crows which had not hatched off was very few.

Mr. Littledale also found four eggs in a nest, *vide* B. N. H. S. Journal, p. 32, No. 2, Vol. I.

I have never found the crow eggs broken, but others have; in these cases, I believe the eggs to have been broken accidentally. The visit of the female Koel to the nest is a hurried one, and when her presence is detected by the crows, her departure is still more so, and eggs are fragile.

There can be no doubt that the young koel ejects the young crows from the nest, as I once found the latter on the ground, under a tree, in which was a crow's nest, that on examination was found to be occupied by a solitary nestling koel. The eggs vary much both in colour and size; pale sea-green, oily-green, dull olive-green, and dingy stone coloured varieties all occur. The markings are olive, reddish-brown, and dull-purple. They average 1.2 inches in length by 0.92 in breadth.

216.—THE SMALL GREEN-BILLED MALKOHA.

Rhopodytes viridirostris, Jerd.

Within our limits the Small Green-billed Malkoha seems to be confined to the extreme south, where it is said to be a not uncommon permanent resident.

Mr. Davidson, C. S., got a nest from Malwa in July containing two eggs, *vide Bombay Gazetteer*, 1880.

217.—THE COMMON COUCAL.

Centrococcyx rufipennis, Ill.

The Common Coucal or Crow Pheasant is abundant throughout the district, with the exception of Sind, where it is replaced by the closely allied *C. maximus*. It is a permanent resident, breeding from May to August, making a large, irregular, globular-shaped nest, generally domed. The materials used in its construction are sticks, twigs, grass, &c. It is placed in the centre of a thorny thicket or high up in a tree. In the former position it is well hidden, but in the latter it is more conspicuous, but not always easy to get at. The eggs, usually three in number, are broad, white, chalky ovals, rather pointed at both ends, measuring 1.43 inches in length by rather less than 1.17 in breadth.

217 *quints.*—THE SIND COUCAL.

Centrococcyx maximus, Hume.

This bird is a common permanent resident near Hyderabad and other parts of Sind, where it takes the place of *C. rufipennis*, breeding about the same time, in the same manner, and laying precisely similar eggs.

Hyderabad (Sind), July to Sept.

Narra (Sind), June to July.

H. E. Barnes.

S. Doig, Esq.

219.—THE SOUTHERN SIRKEER.

Taccocua leschenaulti, Less.

Within our limits the Southern Sirkeer seems restricted to the south-west, extending as far north as Khandalla. It is a permanent resident, and Mr. Vidal, C. S., obtained eggs, but I can obtain no description of them.

220.—THE BENGAL SIRKEER.

Taccocua sirkee, J. E. Gr.

Excluding that portion of the Presidency south of Bombay, and perhaps the province of Sind in the north, the Bengal Sirkeer is fairly common in the remaining portion of the district.

It is a permanent resident, breeding from May to August, making its nest in a fork in some thick bush or densely foliated tree. It is a large flattish structure, composed of twigs, lined with green leaves. The eggs, two or three in number, are exact miniatures of those of the Crow Pheasant. They measure 1·39 inches in length by about 1·01 in breadth.

*W. Khandesh, May.**J. Davidson, C. S.*

222.—THE CENTRAL INDIAN SIRKEER.

Taccocuat affinis, Bly.

I must confess to a great amount of scepticism regarding this bird's title to specific distinction, but Captain Butler records it as "not common in Sind," so it ought to find a place in this paper.

I met with it at Saugor in the Central Provinces, when I obtained a nest containing a single egg; this I left undisturbed, expecting to obtain a full clutch, but the bird forsook the nest. This egg does not differ from those of *T. sirkee*, except that it is a trifle larger.

A CREEK OF THE KONKAN.

BY W. F. SINCLAIR, C.S.

(Read at the Society's Meeting on the 19th Feb. 1889.)

I HAVE to describe to you a voyage on a creek of the Konkan; that is, on the estuary of one of the numerous rivers rising in the ghats, or between them and Arabian Sea, and flowing westward into that sea. These are, throughout the Konnkan south of Bombay, the main

highways of heavy traffic. The tides, flowing not only up and down the creeks, but up and down the coast, are as good as two slow trains a day each way ; and the usual alternation of land and sea breezes tends still further to facilitate the fine-weather coasting traffic.

The waters which I have chosen to illustrate to-day are those of the great Janjira fiord and of its northern branch, the Malati Creek, which is the mouth of a small and nameless stream rising in the Habsan plateau. Suppose that we are standing early on a cold weather morning at the bottom of a saucer-shaped valley in this plateau, perhaps five miles across. All round the hills rise to nearly a thousand feet above us, their summits usually hog-backed or flat, their flanks sloping and thickly timbered. A couple of exceptional crags show the ruins of old-time fortresses against the sky. The bottom of the saucer is cleared and cultivated, and in its very centre is a patch of salt marsh, partly covered with mangrove scrub. Into this projects a little rocky point, on which is our position.

The in-coming tide of the creek at its foot, and a couple of coasting craft loading up with fuel for Bombay, are the only signs of the neighbourhood of the sea, which is, indeed, nearly twenty miles away by the course. Off the landing place our own boat is lying ready, and the dinghy comes ashore for us. For in these creeks it is good navigation to get over the shallowest water against the last of the flood, and we have less than an hour left of that. We draw only three feet ; the coasters, which draw six, are beneaped ; that is, they must wait for a spring tide to get away.

That you may understand what follows, I must describe the party. The captain, fully clothed after his fashion, squats in the very stern to steer. Four men are at the oars amidships, and two forward use long bamboo poles, much more efficient things in shallow currents. These are got up like the gentleman in *Midshipman Easy*, on the principle of duty before decency. A clout, a cap, and a knife (hung round his neck) is the outfit of each ; whereof we shall presently see the reason. For the purpose of destruction we require a couple of sporting griffins, who are posted one on each bow, with strict injunctions to keep the muzzles of their guns out board ; and the courteous stranger is invited to take his seat aft beside the commander of the expedition, who has now the honour to address you. Lastly, the ever-useful Don Domingo is busy making coffee over three sticks,

burning in a little box full of sand. There is no awning, it would be much in the way, and afloat the direct rays of the sun are weakened by the rising though invisible vapour, and less dangerous than those reflected from the surface, which seem to burn through the eye into the brain. Against these we are armed with smoky spectacles, but don't want them so early in the morning, for our voyage is Westward Ho !

As we push slowly down against the flood, we meet a shoal of grey mullet playing and jumping, and the boys quarrel as to whether or no they are salmon-trout, but are told that there are no trout in India, and to keep their eyes open and mouth shut. Presently a crack opens in the edge of our saucer, and we head south-westward through a wooded gorge, the bottom of which, not half a mile wide, is chiefly occupied by the creek and its mangrove swamps. The neap-tide has failed to cover a little sandy islet, and on it a dozen grey and white birds, rather larger than snipe, sit still and close together. As we come up, they fidget and rise, and in an instant the gunner on that side lets fly at them. A couple fall nearly ahead of the boat ; we steer for one and pick it up with a landing net, and a man jumps over board and retrieves the other. The griffin who has not shot them, rebukes his fellow griff for shooting "snippets," who retorts that they are just as hard to shoot as "snipe" and "*A vis sapulissima in patina.*"

He has not much Latin, this boy ; the other has none, but refuses to consider himself shut up, and appeals to the quarterdeck. We find that one bird is a red shank and the other a green shank. Both are large sandpipers of the genus *Totanus*, and have been waiting on the bank for the ebb. Most shore birds, and especially the sandpipers and dwarf plovers, have this habit, feeding alone or in small and scattered flocks on the foreshore, and packing for repose at high water. Both of our birds are good for the pot, as implied in their slayer's Latin tag.

As we pass on, we find on similar banks several small flocks of curlews, and what our men call young curlews, and so they look, but they rise with a single sharp note, often and quickly repeated, which marks them for whimbrel, a smaller bird and more delicate eating. The tide is now with us, and the water has widened and deepened so we get in the oars and hoist the sails to the morning land wind, keeping on the outside curve of the stream, where the water is deepest and we can steer pretty close to the mangroves.

These, by the way, are true mangroves, very different from the small-leaved, greyish *Avicennia* of Bombay harbour. Their great stacks of roots are hidden by the flood-tide, but the laurel-like leaf and heavy scent of the flowers filling the air of the creek distinguish them at once.

There are lots of small birds fluttering indistinguishable in the trees, and on the outer boughs every here and there a blue kingfisher. Our griffins prepare to make war upon these, talking about hats ; but we disapprove of killing pretty little birds to put in hats, and check them, observing that there is fitter game ahead, where the glasses show a snake-bird, which looks almost white in the morning sun, the sign of plumage in good condition. As the boat closes with him, he rises and flies off before her ; the gunners grumble, and are told to hold their tongues and wait a minute ; sure enough, about half a mile ahead the bird turns and comes back almost over the boat. A couple of men have already slipped into the dinghy astern with a landing net, and as they hear the shot, slip the painter, while the sail-trimmers jump to their feet and put the boat under bare poles in an instant, and the stern grapnel goes overboard with a splash.

The bird is only winged, and the chase would be a long one, but he has foolishly dived with the ebb tide and comes up near enough to the boat for a second shot to catch him in the head and neck, and in a minute more he is in the landing net, the grapnel coming up and the sails coming down. The shot has put up a flock of teal a mile ahead, which wheel about a little and then settle, as the bowman observes, just where we got a couple two years ago, in a back water behind a little island. As we come down outside, we anchor, man the dinghy, and send a gunner ashore to stock them there, and he gets a couple. Meanwhile Domingo has done skinning the snake-bird, and the handsome scapular plumes are pressed between two old cigar-box boards lashed with twine, the rest going over board to be presently picked up by a brahminy-kite that has been following us. He can hardly lift the carcase, but at last manages to strand it on an island.

Here the creek opens into a triangular lake, with sides of about a mile each, and we fall in with a couple of fishing canoes, and chuck a rupee into one of them. Thereupon the fisherman begins to chuck mullet aboard us till it is clear that the supply exceeds the demand, and we call out to " 'vast heaving." It is getting near

breakfast time, and the mullet come in handy, so the gunners are called aft and the meal cooked and served—a trifle roughly perhaps.

Suddenly, while every one is busy with his plate, there is a tremendous rush in the air and splash in the water not half a cable off. One's first idea is that of a bolt fallen from the blue; but before the spray has well got back to the surface, an osprey emerges from it with a two-pound mullet in his claws and sails off to an islet, where his breakfast-table has been established for many generations. As the boat rounds it, the scene is extremely beautiful. A new lake, near six miles long and four wide, opens before us, the shore still mountainous and well wooded, the islands covered with mangrove. The wind has now shifted to the westward, and the boat is close-hauled, but makes good way with the help of the ebb. The gunners have not gone forward after breakfast; but presently there is some stir and muttering in the bows, and the word is passed aft of "Rohis," that is flamingoes. Sure enough the field glass shows a flock of large, white birds swimming in deep water nearly a mile ahead, and the boat goes about twice to get a good weather-gauge of them—always necessary in sailing to birds. We get out a rifle, for it is likely enough that they will not allow us within small-shot range, and at about eighty yards they close together and rise in a cloud, but one falls to the double shot, and is presently aboard and being admired as he deserves. Not only is he strange in shape and beautiful in colour, but a very good bird for the table, being, it must be remembered, simply a great outlandish goose.

We have now a head wind and but little left of the ebb tide that has favoured us so far. The canvas dinghy is folded up and hauled aboard and oars got out to windward, and although the next islet shows us a group of oyster catchers on its rocky beach, and a family of otters are diving and playing at the edge of the mangrove swamp, the guns are covered and stowed away. As we round the next point leaving the lake behind there comes into sight ahead a great black mass of towers and walls standing sheer out of the creek and beyond it a water horizon, and we run up our tiny flag. It is ten to one if the fortmen can see its colours at all; but our sail is of a cut unusual in these waters, and presently there is a movement visible on one of the towers, a great flag rises slowly on its halyards, and a puff of smoke hides tower and flag for a moment, to be followed by another and another, until we have got our proper greeting.

It is a voice out of the past, for the guns that spoke it bear the initials and crown of C. R. S., that is Carolus Rex Succæ, and the date 1665 ; and the fortress itself is the island of Janjira, and we are here in touch with the 17th century. But if I were to tell you of all the other things that are to be seen here and hereabouts, we should, I think, be in touch with the 20th before the end of the chapter ; so for the present I must stop.

OUR HYMENOPTERA.

BY ROBERT C. WROUGHTON.

THE principal object of this paper is to try to awaken an interest in a group of insects, mostly small and with little in their appearance to catch the eye ; but regarding which nevertheless it is the simple truth to say that of the living inhabitants of this earth they rank next to ourselves in point of intelligence. The wonderful instincts of the Honey Bee are common property, and we all know that some kinds of ants keep slaves, while others herd cows ; but many points in the habits of even the common house ants are mysteries still, and of the ways of the countless Wasps, Ichneumons, Mason Bees, Leaf-cutters, and others of the tribe which swarm about our houses, and build their mud huts on the walls, or take possession of key-holes, and rear their families under our very eyes, we know absolutely nothing at all. It is not that you and I know nothing : nobody does. About the great majority of these insects nothing has ever been recorded. It would be a lasting glory to this Society if we could give the world some account of the habits and life-history of our local species, and it would be a lasting source of delight to every individual member to get once for all thoroughly interested in such a subject ; but at the outset there is a difficulty which deters us all, a barrier which few have the means or the leisure to surmount. It is this, that if we make a collection, we cannot name our specimens, and if we make observations, we cannot record our facts without names. The classification of the Indian *Hymenoptera* is a pathless waste, without a book to light us through it, or a museum to which we can go for guidance. In these circumstances there is only one thing to be

done. We must get together a collection of our own, arranged and named, to which each private collector may go to compare and name his specimens, with this object I have been working for some years, and with the help of friends have gathered together about 500 species, which are roughly classified and a few of them named. A large number have been sent to England and will soon return, I hope, with their baptismal certificates : the rest are in a cabinet in this room. What I ask for now is help—help in collecting specimens and help in collecting facts. Specimens may be pinned, and kept in corked boxes, like butterflies, or popped into spirits, or put into a small bottle with dry sawdust (which typifies the classification). Facts, to be of any value, must be accompanied by the insect to which they refer. What I should like most is to see many of our members making collections for themselves, and I need not say how glad I should be to give them any help in my power. One department of the subject which I specially commend to lady members is the keeping and rearing of ants. Ant houses are easily made, and Sir John Lubbock's well known book will give many hints on the management of these pets.

I will now ask your attention to a very sketchy account of the classification of the order of insects called *Hymenoptera*, which may serve as pegs on which to hang a few notes about each principal group. I am afraid you will find the subject dry : I cannot make it otherwise ; but even the pegs on which we hang our clothes are dry.

Insects, or the 'insecta,' as now recognised, are distinguished by having in the perfect state only 2 antennæ, only 6 legs, and the body divided into 3 parts, *viz.*, head, thorax and abdomen.

As a rule the life history of an insect comprises four stages, *viz.*, 1st the egg, 2nd the larva, 3rd the pupa, 4th the imago. These stages are sometimes very sharply distinct as in the butterflies, sometimes indistinct, though traceable, as in the Grasshoppers, while sometimes they are completely lost as in the mysterious parthenogenesis of the Aphidæ. As a rule insects in the imago stage are winged, but there are many exceptions to the rule of which the workers among the ants and the domestic flea are familiar examples, the latter too familiar. More than a century ago Linnæus, basing his classification mainly on the character of the wings, divided the insecta into 7 orders, *viz.*:—

1. *Coloptera*, or sheath-winged, *i. e.*, Beetles.
2. *Neuroptera*, or nerve-winged, *i. e.*, Dragon flies, white ants, &c.

3. *Hymenoptera*, or parchment-winged, *i. e.*, Bees, wasps, ants, &c.
4. *Lepidoptera*, or scaly-winged, *i. e.*, Butterflies and moths.
5. *Hemiptera*, or half-winged, *i. e.*, Bugs, aphidæ, &c.
6. *Diptera*, or two-winged, *i. e.*, Flies.
7. *Aptera*, or no-winged, *i. e.*, Fleas.

Though many changes and additions have since been proposed at various times, yet the generally accepted classification now is the same, in nomenclature at least, as that of Linnæus, except that the *Aptera* have been absorbed into the *Diptera*, and a new order, *Orthoptera*, or straight-winged, has been added, immediately following the *Coleoptera*, to contain the grasshoppers, locusts, crickets, cockroaches, *Mantidæ*, *Phasmidæ*, &c., which Linnæus included, along with the bugs, in his *Hemiptera*.

Kirby estimates that out of 222,000 species of insects known as inhabiting the world, the *Hymenoptera* comprise 31,000, ranking third on the list after *Coleoptera* with 97,000 and *Lepidoptera* with 45,000.

The chief distinguishing characters of the *Hymenoptera* are :—

1. Four apparently naked wings, with few veins (hence the name from *ύμν*= parchment).
2. Mouth furnished with both mandibles and a proboscis.
3. Female furnished with an ovipositor often modified into a sting.
4. *Larvæ* usually footless, pupæ inactive.

The *Hymenoptera* are primarily divided into two sub-orders, *viz.* :—

Terebrantia, in which the female is armed with an ovipositor.

Aculeata, in which the ovipositor is modified into a sting.

The *Terebrantia* are again sub-divided into two groups, *viz.* :—

Phytophaga, or vegetable eaters.

Entomophaga, or insect eaters.

The word “eaters,” however, does not refer to the imago or perfect insect, but to the larva or grub form.

We may dismiss briefly the *Terebrantia phytophaga*, which comprise only two families, the *Tenthredinidæ* and *Siricidæ*. In the former the larvæ feed exposed on the leaves of trees like the caterpillars of butterflies, while in the latter they bore in the wood. We have no specimens of either in our collection. The *Siricidæ* are chiefly confined to Pine forests, so we may well have none in Bombay, but as regards the *Tenthredinidæ*, though none have been found, it does not follow that there are none.

The first family of the *Terebrantia entomophaga* is the *Cynipidæ*. They are for the most part microscopic insects, and the very large majority of those described are gall producers. "Apples of Sodom" and "Robin's pincushion" at home are the work of cynips, while the ink gall of commerce is the handiwork of an exotic species. No one has worked the Bombay, or indeed to any extent the Indian *Cynipidæ*, so that for any of our members with leisure and a turn for microscopic research there is a grand field. It is a most interesting family, many of the species being dimorphous, and their reproduction nearly, if not quite, as complex as that of the *Aphidæ*.

The galls of the *Cynipidæ* are said to be often much infested by insects of the next family, viz., the *Chalcididæ*. We have specimens of a few species, but as in the *Cynipidæ*, very many are extremely minute. Of the specimens in the Society's collection, No. 1 (*Leucospis atra*) was bred from pupæ of the common Bombay butterfly, *Delias eucharis*. Another is parasitic on a small Mason Bee, which may be found during the rains in the Dekhan busy constructing its nest in the holes and cracks of every wall, and lately I have reared a large species from the nest of a wasp (*R. litidulum*).

The next family, the *Ichneumonidæ*, is a very large one, no less than 1,200 species having been described by one European writer. A very large proportion are probably parasitic on the larvæ of various *Lepidoptera*, but no observations as to the life history of Indian species have been recorded: indeed few, if any, seem to have been named. At any rate some of the commonest in the Society's collection when sent home to the British Museum were said to be undescribed.

The *Braconidæ* are a small family which has lately been separated from the last, the differential character being chiefly the comparative length of the various antennal joints, and the soldering together of the 2nd and 3rd fragments of the abdomen in the *Braconidæ*. Some of the *Braconidæ* are very minute, and are parasitic on the *Aphidæ*.

The *Evaniidæ*, or at any rate the commoner species of the family, are parasitic on the cockroach. *E. lævigata* in our collection is a very common Bombay insect, haunting our bathrooms, and a most extraordinary looking insect it is; the abdomen is very small and attached by a pedicle, or stalk, apparently to the nape of the neck.

The last family of the *Terebrantia* is the *Chrysididæ*. By some it has been proposed to form it into a distinct group under the name

of *Tubulifera*, but this view has not been generally accepted. The *Chrysididæ* are known as Ruby-tailed Flies, Emerald Wasps, &c. Some of the European species are a lovely rose or flame colour. We have a great number of specimens in our collection, but their classification, even into genera, is very obscure. The *Chrysididæ* are all parasitic, ordinarily on other hymenoptera, the solitary Mason Wasps being specially victimized. In order to provide for their young they resort to "lurking-house trespass." The ichneumons by means of their ovipositors pierce the skin of the victimized larvæ in whose body the eggs are laid and on whom the ichneumon larvæ, when hatched, prey. The *Chrysididæ* act quite differently. The female hunts about until she finds, say, a wasp building its mud nest, and there she sits down to wait. I have watched the manœuvres of a chrysis during nearly an hour. Each time the wasp quitted the nest to seek more building material, chrysis advanced rapidly to take stock of progress made, retiring each time to her lurking place about six inches off. At last the wasp had completed her nest and put the finishing touches, and started off to search for the larvæ with which it was to be provisioned. This time chrysis, after entering and surveying the nest, came out, but instead of returning to her lurking place, she backed into the newly-made nest, and no doubt, laid her egg after which she came out and flew away. When a chrysis has thus laid her egg in a newly-finished nest, it is unsuspectingly provisioned by the builder who also lays her eggs therein. The larva of chrysis, however, hatches first and consumes all the provision, and the rightful occupant thus dies of starvation, and the cell which should have produced a wasp produces a chrysis.

The second sub-order, *viz.*, the *Aculeata* (or Stingers) is divided into four groups or main divisions, *viz.*:—

1. *Heterogyna* containing the ants.
2. *Fossores* (Diggers), containing all the rest, except
3. *Diploptera*, *i. e.*, the Wasps.
4. *Anthophila*, *i. e.*, the Bees.

The *Heterogyna* comprise only the *Formicidæ* or ants, and are divided into the following three families:—

1. *Formicinæ*, which are ants proper and have no sting, but many of which bite severely, as, for example, the common red, *Ecophila smaragdina*, who sews up mango leaves for a habitation, and seems to be able intuitively to select for attack the softest part of any person invading his haunts. The common big black ant of

our bungalows (*Camponotus ardeus*) (with his country cousins *sylvaticus* and *callidus*), as well as his deadly enemy the small black ant, whose name I do not know, but who seems to spring in hundreds from nowhere when sugar has been left about, are all *Formicinae*. To which, also belong the ants which at Maballeshwar, Matheran, &c., trace out white paths on the ground.

2. *Ponerinae*, which like the *Formicinae*, have only one node, or knot, on the abdominal stalk, but they sting most severely. There do not seem to be very many species of *Ponerinae*. The common species is a large insect living under stones in comparatively small communities. Its sting is quite as severe as that of a bee.

3. *Myrmecinae*, which are very numerous. They have two nodes on the abdominal stalk. To the *Myrmecinae* belong all the various kinds which harvest grass seed; also the ant which, living under ground, raises concentric mud rings round the mouth of its nest. In another species of the *Myrmecinae*, common enough in the Konkan, the workers are very minute, but the queen is a comparatively gigantic insect, being $\frac{3}{4}$ in. long. This species has at least two classes of "soldiers" of different sizes, the smallest of which would make half a dozen of the minute workers. As far as I have been able to discover, this species is stone-blind; in fact, as far as the worker is concerned, has no eyes.

I have seen a column of these ants in course of migration. A number of workers went ahead and built a covered way or tunnel in which the main body travelled, dragging with them dead earthworms, beetles, &c. It was curious to notice that in this commissariat-transport work a willing hand was lent by the smaller-sized soldiers. When, however, I broke down the tunnel, a halt was called, and parties of workers set to work to repair the damage, but as this manual labour, though fussing about a great deal, the soldiers were too proud to assist. The larger soldiers were evidently purely fighters, for they did not help even in the transport of provisions. I believe this ant to be a species of the genus *Pheidolor*.

There is another insect very common in Bombay, and which in its female or queen form swarms about the lamps at certain seasons. It is a palish brown ant, with a large unwieldy body. It belongs to the *Dorylidae*, as to whose place among the *hymenoptera* there does not seem to be unanimity of opinion. While some place it as a distinct sub-division of the *Heterogyna*, some go to the other extreme and class it with the *Ponerinae*.

It is not necessary to tell the members of this learned Society that the ants are social, living together in large communities. Each community consists of females or queens, males, and workers (which are undeveloped females). In some species there is a fourth class, *viz.*, the soldiers, which, like the workers, are modified females. The female ants have got the name of queens, I imagine, from the analogy of the bees. In an ants' nest, however, there are a number of queens, and from the researches of Sir J. Lubbock and others, it appears that ants have not acquired the art of "manufacturing" queens at pleasure, as the bees are known to do. An ant community consists principally of workers with, in some species, a proportion of soldiers. Certainly in some species, and probably in all, however, there are seasons of the year when there are queens, while, as far as I know, in all species the males are found in the nest only just before the nuptial flight, from which they do not return. The queens and males are at first winged, but at the conclusion of the nuptial flight the queens lose their wings. I have seen it stated that the queen having lost her wings wanders about until she is found by workers of her species, who take charge of her and commence the building up of a new community. It may be so with some species, but Sir J. Lubbock's experiments give little support to this theory, and I have more than once found a queen of *Camponotus callidus* unattended by workers and brooding over a small number of pupæ, no doubt the product of eggs laid by her and the germ of a new community.

We commence the next group of the *Aculeata* with the *Mutillidæ*. They are often called "solitary ants," from supposed resemblance in the shape of the female to a huge ant. The female mutilla is wingless, ordinarily covered with down, and usually gorgeously coloured with rings and spots of gold, silver, or crimson on a brown or black ground. The male on the other hand is usually dull coloured, and is winged. A very great number of species have been described and named, but in a very great majority of cases only the male or the female of each species is known, and there is no doubt that with further investigation nearly half these species must be merged in the other half. Very little seems to be known of the life history of mutilla. The general opinion seems to be that the female makes burrows in sandy soil, provisioning her nest with flies. I feel certain and hope shortly to have convincing proof that some at least of our *Mutillidæ* are parasitic, not by means of lurking house-tres-

pass, like the *Chrysididæ*, but by burglary on the mud nests of other *hymenoptera*.

The next family, the *Scoliidæ*, is represented by specimens of a good many species in our collection, but my attempts to investigate their life history have all failed. The closely allied *Thymidæ* are almost exclusively American.

The *Bembecidæ* comprise very few species. At first sight they may be mistaken for wasps, which they much resemble in their colouring, the illusion being increased by the fact that they are gregarious. They are not however social. Each female digs her own burrow, and a very pretty sight it is. She works exactly like a terrier dog, loosening the soil with her fore feet and mandibles, dragging it backwards to the entry, and then kicking it out with her hind legs in showers to a distance of some inches. The commonest of our *Bembecidæ*, *B. sulphurescens*, stores her nest with *Diptera*, and probably others do the same. I have never seen the capture of the prey by *Bembex*, but as her flight is most powerful it cannot be a very difficult task.

The *Pompilidæ* comprise a good many species, but their habits are not well known. I have seen the smaller ones carrying spiders, dragging them backwards, but have no idea what the larger kinds employ to provision their nests. Some of the species of *Mygimnia* are the largest among the *Hymenoptera*.

In the family of the *Sphegidæ* are included genera of widely divergent shapes. *Pelopæus*, commonly known as the Sand Wasp, is a very common form. Two species (*Bengalensis*, dark blue, and *Madraspatanus*, banded black and yellow,) are familiar to every Indian resident. They build mud cells in all sorts of odd positions in our rooms, which they ordinarily stock with spiders, though sometimes with caterpillars. *Madraspatanus* takes great precautions against parasites, closing the entry to her completed cell with a mud disc made for the purpose, but shows want of intelligence in not using the disc a second time. Several discarded discs may always be found below her nest. I speak from a man's point of view: possibly she could give a satisfactory explanation of her proceedings, and unfortunately we cannot get her opinion of the operations of our P. W. D. It is noteworthy that I have never succeeded in breeding *chrysis* from a nest of *Pelopæus*, and I thought that they were proof against all but microscopic parasites (? *Chalcididæ*) until quite lately I caught a species of *mutilla* on a nest of *Pelo-*

pæus, and on removing the nest found each cell had been broken into, by mutilla no doubt, in order to lay her eggs, for about the same time from a nest of *Pelopæus* received from Madras I reared a mutilla of a closely allied species. *Ammophila* may often be seen carrying large green caterpillars, twice her own size, and *Chlorion* huge crickets. All the *Sphægilæ* bury the insects alive in their nests, having first paralysed them by stinging them, and in this way provide a supply of fresh meat for their offspring. Some stress has been laid on the high development of instinct involed in the practice, for it is stated that to be effectual the sting must penetrate a nerve centre. I confess I should like more evidence to show that a sting in any part of the body would not be equally effectual.

The remaining families of the *Fossoræ*, viz., *Larridæ*, *Nyssonidæ*, *Crastronidæ*, and *Philanthidæ*, contain mostly small insects. Some of them make their own burrows, while some I believe utilize any suitable hole or cervice. Very little or nothing however is recorded of our Indian species. Flies, gnats, aphides are recorded as stored by English species, and some of the larger *Philanthidæ* are said to destroy great numbers of bees.

The next group of the *Aculeatæ* is the *Diploptera* or Wasps, the most striking character of which, as shown by the name, is the longitudinal folding of the wings in repose. A very large proportion of the solitary wasps are included in the family of the *Eumenidæ*. The genus *Eumenes* seems to me to be more persecuted by parasites than any other of the Hymenoptera. In the local vernacular they are known as "Kumbharin," from their habit of building mud nests. These they store with caterpillars, as far as I know always green, and always of the *Geomitridæ*, commonly known as "stick caterpillars." *Eumenes* seems to be rather muddle-headed in her architecture. She usually commences by building a shapely enough cell, like the common native earthen pot, but usually proceeds to surround this with others sloping at all angles, and if not disturbed, renders the whole building as shapeless as possible by an irregular layer of mud put on at random. The idea of thus assimilating her nest to a handful of mud thrown against a wall is a good one, but to an ordinary mortal it would seem simpler to build roughly and irregularly from the first. When the nest is built on a white background it is almost invariably ornamented (?), as a finishing touch, with streaks of chunam. Is this meant to make the mud ball less visible? If so, why not completely whitewash it? Are these precautionary

measures adopted against mortals or against insect parasites? It is a curious fact that nests built on glass are always streaked with white, hence glass is apparently white to the eyes of *Eumenes*. I have said that *Eumenes* is much parasited. Here is a by no means abnormal instance. I took a nest of eleven cells. Three cells yielded each a beetle, three yielded each a chrysis, two yielded each a swarm of flies and three only yielded *Eumenes*. The beetle I mentioned above has been identified for me by the authorities of the Indian Museum at Calcutta as belonging to the *Mordellidæ* and as allied to a European species which is a parasite on one of the European *Diptera*. Whence this race antagonism? Another genus of *Eumenidæ* is *Rhynchium*, of which a brown species is very common about our rooms and makes mud cells, not building like *Eumenes*, but adapting holes and crevices of wood work, &c. A black species, *Nitidulum*, frequents our verandahs and builds her nest like *Eumenes*. The cells remind one of the old nursery pictures of Ali Baba's oil jars, and are built in clusters of 20 or 30 or more, the material is mud, and the whole is covered with a dark-coloured sticky varnish, possibly intended to keep off parasites. If so it is a failure. The Social Wasps, or *Vespidæ*, are represented chiefly by three genera, viz., *Icaria*, *Polistes* and *Vespa*. *Icaria* best represents what we naturally picture to ourselves as a "wasp," except that they have not the striped look of our English *vespa*. There are a good many species which all build 'brown paper' nests. Usually these are of small sizes and are supported on a stalk, but one species arranges the cells so as to form a long tapering nest a foot and more in length. The principal representatives of *Polistes* is *Hebræus*, which is not unlike our English hornet in shape, and is pale yellow with black stripes. *Hebræus* lives in immense communities, and when in possession of a bungalow rapidly becomes a nuisance. Of *Vespa* we have two forms, viz., the common, *Vespa cincta*, and *Vespa indica*, who gradually takes his place as we move north to the Punjab. *Cincta* is the big dark brown wasp with a broad yellow band, which may be seen in numbers about sweetmeat-sellers' shops. *Cincta* is said to loot the pupæ from the nest of other *Vespidæ*, but I confess in my mind he is always connected with a tray of "dudh-pendis," "jelebis," &c., in the hands of a very dirty retail sweetmeat-seller. Among the *Vespidæ* as with the ants there are three orders or estates, the queens, the males and the workers, but among the *Vespidæ* all classes are winged.

I feel that I can drop the apologetic tone at length when I ask your attention to the last group of the *Aculeata*, viz., the *Anthophila* or Bees. The *Andrenidæ* are solitary species of small size and dull colouring. Many of them nest in crevices of walls, but some burrow in the ground. Unless looked for most of the species are likely to pass unnoticed. The *Apidæ*, in addition to the social honey bees of the genus *Apis*, contain a number of solitary genera. *Megachile* comprises a great number of species, some of which are very common. *M. lanata* may be heard humming about the room at almost any time of the year. She builds a tube of mud, which is divided off into cells, each containing an egg and a supply of "bread." This tubular nest is put in the most extraordinary places, inside a boot left unworn for a couple of days, among clothes exposed on a shelf, in a gun barrel, in a shell, between books on shelf, &c., &c. Some of the *Megachile* line their mud tubes with a membrane evolved out of themselves, but many use cuttings of leaves which are made neatly into cigarettes, and fitted into burrows in the ground. Though solitary, *Megachile* is said to be sometimes gregarious. Be that as it may, *Xylocapa*, the Carpenter Bee, is almost always gregarious. The large holes so often seen in old dead trees, looking as if bored with an augur, are the work of *Xylocapa*. Though a hundred and more species have been made in this genus, to the ordinary observer the greater number are indistinguishable. A large blue-black Bumble-bee, making a very loud buzzing in its flight, is a description which will cover very many species. There are however brown species which are crepuscular if not nocturnal. *Colioxys*, another genus, is said to be parasitic in the nests of *Xylocapa*. It has been bred from nests of *Xylocapa*, but that it is parasitic seems to me to need further proof. Finally, of the *Apidæ* with which the classification of our Hymenoptera closes, we have three common species, viz., *Floralis*, the maker of what is known as "fly honey," is the smallest. *Nigro-cincta*, much larger in size, is common in our gardens, and in places is said to have been successfully domesticated, while the giant *Indica* is for the most part an inhabitant of the jungles. Building huge combs on big trees, or on the face of precipices, this bee constitutes himself the Raja of the whole region. Woe to him who disturbs *Apis Indica* by daylight. He will be lucky if he escapes with his life. Like the wasps, the Social Bees have winged workers, but unlike the wasps

and ants, they are said to have only one queen, and to be able in case of need to evolve a queen from a larva, which in the ordinary course, would have produced a worker by special feeding and education.

I hope I have given you some idea of the variety of curious points on which information is wanted. I will refrain from quoting a familiar hymn to which my subject might have tempted me; but I will apply the moral of the honey bee so far as to point out that if each member of this Society would contribute something, just an interesting fact which had come under his own notice, a specimen or a nest which he had found in his house, we should soon have a respectable store of information on the manners and customs of this most interesting order of insects.

AN ADDRESS TO STUDENTS OF BOTANY IN WESTERN INDIA.

By A. K. NAIRNE.

It may be assumed that in our days many of the young English men and English women who go out to India would like to know something about the floral beauties which meet their eyes wherever they turn. Many of them have known all the common flowers of the woods and the roadsides at home, and have very likely learnt enough of the elements of Botany to know the orders to which the commonest or the most beautiful belong. And it seems unnatural to them to be set down in a country full of beautiful flowers and to get no knowledge of them. In the same way there must be many intelligent young natives, whose education has taught them that every plant has its name and its place in classification, and who would therefore like to learn a little practically about Botany and its treasures. Now (at home the number of small books intended to help beginners in the study of Botany is very great; the number of those which give lists of all the wild plants in England, more or less scientific, but all simple, is very considerable, so that it is very easy for any Englishman to get up the Flora of his native land, if only he chooses to give the time to it. But it is very different in India. None of these small books of Botany have yet appeared here. The enquirer may, indeed, find the names, both native and

scientific, of the *trees* of any district he may be in, in of one or other volume of the *Bombay Gazetteer*, but he knows not where to turn for information as to the many beautiful shrubs, creepers and herbs, which in most Indian districts call forth constant admiration, and are many times more numerous than the trees. A list of the botanical books available for Western India will show how very badly off the unscientific or half-scientific enquirer is. There are two books relating exclusively to the Bombay Presidency, one of which, Dalzell and Gibson's, aspires to be a Flora. But five minutes' examination of this has been sufficient for very many men, who would not be afraid of studying something even much deeper, if there were any chance of mastering it. But the first thing that makes itself manifest with regard to Dalzell's book is that it requires half-a-dozen other books to make it intelligible. There is not a word of explanation as to the plan of the book, no description of orders, and, what is worse, no description of genera. And the genera were (as was probably inevitable), taken from one author or another just as it happened. The book is, in fact, a collection of specific descriptions of plants, arranged according to the natural orders certainly, but with (apparently) no other system running through it. The language of the descriptions is unnecessarily difficult, the native names of plants are given very rarely, and some of the commonest trees in the country are not named at all except by their Latin botanical denomination. The other local work is Graham's "Plants of Bombay," a mere sketch unfortunately, though easily recognizable as the work of a great master. But judging by the difficulty of getting this work ten or fifteen years ago, I should fear that by this time it is almost unattainable.* When we turn to the Botany of India generally, we naturally begin with Hooker's Indian Flora. And, indeed, there is no other single work from which we could hope to get information as to all, or nearly all, the plants to be found in Western India. But apart from the fact that the work will probably not be completed for some years, its very great range

* The author seems to be unaware of the publication, in 1886, of the 25th volume of the *Bombay Gazetteer*, containing—"Useful Plants of the Bombay Presidency," by T. C. Lisboa; "Botany of the Bombay Presidency," by Surgeon-Major W. Gray, L.M.L.Ch.; "List of Gujarat Trees" from Materials supplied by G.H.D. Wilson, Esq., G. C. S., and Lieut.-Colonel T. G. McRae, which articles to a great extent, though not fully, supply the want the author complains of. The Hon. Mr. Justice Birdwood's "List of Plants of Matheran and Mahabaleshwar," published in this Journal, also affords great assistance to students of Botany for these particular localities.—G. C.

renders it almost useless for any but a professional botanist. Page after page is taken up with descriptions of plants found only in the Himalayas, or Ceylon, or Java, or the Straits, so that those which belong to what we may call India proper, are in a way crowded out. But this is not the only objection. The great expense of the work is a fatal one as regards ordinary students. Then also as to the grouping of orders. Many will have noticed that the old division of exogens into *Thalamifloræ*, *Calycifloræ* and *Corollifloræ* does not appear, and where one is always wanting more light to take away even a little of what there was before is a distinct hardship. But the absence of these divisions does not mean that they have been abandoned, but that they are assumed to be known, for I was told at Kew that the Indian Flora, like all others prepared there, is based on Bentham and Hooker's "Genera Plantarum," and in this not only are these three great divisions of orders given, but a fourth is introduced, *Discifloræ*, and the orders are also arranged in groups subordinate to those great divisions. Added to this the similarities and differences of each order from its immediate neighbours is there given, and this every one will acknowledge to be most valuable. But the "Genera Plantarum" is quite out of the reach of the ordinary botanical students, for, besides being a large and very expensive work, it is written in Latin. * Thus there is practically nothing systematic as to India generally which the unscientific botanist can turn to to help him in identifying the plants of the Bombay Presidency. I ought perhaps to mention Professor Oliver's little book ("First Book of Indian Botany") which is intended to teach the beginner the orders common in India, and which might therefore, to some extent, make up for the deficiencies of Dalzell and Gibson. But I never found it of much use, the descriptions, I think, are too difficult, the examples given far too few; it is, in fact, too much the work of a professional botanist, and it smells of the Herbarium rather than of the open contry. If it had gone entirely on the lines of Lindley's "School Botany" (for England), an old and valued

* I feel bound to add, to prevent any one taking trouble to get the information, that neither the division *Discifloræ*, nor the subordinate groupings of orders, will be found of any use to the ordinary student. For there are almost as many orders without conspicuous discs as with them in *Discifloræ* and some orders with conspicuous discs (e. g., *Myrtaceæ*, *Umbellifloræ* and *Araliaceæ*,) are left in *Calycifloræ*. And the subordinate groupings of orders I found useless, because in the first place the definitions are full of alternatives, and in the second place the distinctions depend mainly on such obscure points as the number of cells in the ovary, position of the ovules, nature of the albumen, and so on.

friend, I suppose, of many besides myself, it would have been most useful, and would have given any young student a good start; but it is quite different.

I have not set down this list of difficulties merely for the sake of making a wail, or to induce young botanists to give up their hopes and their studies till better days come. But I lately came upon something which I thought might help some of those who are painfully struggling (as I did for many years) to identify the plants they meet with one of Dalzell and Gibson, with the help of other books, like the invaluable work of Roxburgh, which contains just a few Bombay plants. The work I mean is Rousseau's "*Lettres Elementaires sur la Botanique*." (Vol. 4 of Rousseau's Works, Lahure's edn., Paris, 1857.) He began by simply showing the difference between a monopetalous and a polypetalous corolla, and then chose six of the largest orders to explain and illustrate. He took, of course, those of the large orders which are most fully represented in France, three monopetalous and three polypetalous. They were (in his order) *Liliaceæ*, *Cruciferae*, *Leguminosæ*, *Labiatae*, *Umbelliferae* and *Compositæ*. The fourth is what I shall have chiefly to speak about, so I will here only say that it was not the order *Labiatae*, but a group; the name of 'Fleurs en gueule' being given by Rousseau to all flowers having a two-lipped corolla and didynamous stamens. Now, of the other orders described by Rousseau and mentioned above, Nos. 1, 2 and 5 are not sufficiently common in Western India to serve our purpose. *Leguminosæ* and *Compositæ* are, and it would be easy to take three other orders (or groups of orders) common here, and thus to describe generally within a very reasonable compass and in a simple classification a very considerable portion of all the plants of the Presidency. Rousseau's idea was that if the student learnt up these great orders to begin with, so as to know the species common in his own country, and to be able to recognise other species of the same orders when found elsewhere, this would give him such a start that he would have no difficulty in going on, and would little by little learn to distinguish most of the orders. It will be easily seen that such a system as this is quite opposed to the ordinary modes of teaching scientific botany, and may be objected to accordingly. But the answer to that is that the ordinary modes of teaching imply that the student will be able either to study the science in a systematic way more or less at his leisure, or else to have a good supply of scientific books to refer to. That this last condition cannot be fulfilled in

W. India I have shown ; and as most of the students whom I am thinking of in writing this paper are scattered about the Presidency often in out-of-the-way districts, it is not at all likely that they will be able to supplement their scanty scientific education by attendance at lectures or resort to libraries. Now one of the chief reasons why botanical books are repulsive and botanical classification difficult, is from the chief distinctions of orders and genera being taken from the smaller parts of the organs of generation of the plants, and so almost always involving microscopical details. If plants could be classified by such prominent parts as the petals or the leaves, a great part of the difficulty to beginners would be avoided, and a great many barbarous looking words got rid of. I do not of course mean that this can be done; but the classification of Linnæus depending on the number and arrangement of the stamens and pistils, is far easier for beginners than what is called the natural system; but it has, unfortunately I think for people situated as those for whom I am writing are, been almost entirely abandoned.

I propose in this paper to work a little on Rousseau's lines with the view of helping students not far advanced in the identification of the common plants around them. I shall in this paper bring together all the orders containing flowers with bilabiate corolla: and didynamous stamens, showing where they agree and where they differ, and shall then describe, as shortly and simply as is possible for identification, a certain number of the commonest and most remarkable species found in W. India. I put it this way, because it is clear that plants attract the attention of ordinary observers either by being very common without reference to there being anything attractive in them, or by being very conspicuous, though they may not be common.

The following are the characteristics in very simple language of the whole group of plants of which I am writing. Corolla monopetalous, *i.e.*, all in one piece, the lower part (and generally the larger part) being a tube, whether broad or narrow, the edge of the flower (at the top of the tube), which vary very much in size, being variously cut, not symmetrically, but more or less into an upper and lower lip.* I should mention that Rousseau made a

* Take as examples of a very narrow and a very broad tube the corolla of *Achimenes* and *Gloxinia*, respectively ; and as examples of a very strongly and a very obscurely two-lipped corolla, that of *Salvia* and *Lantana*, respectively, remembering that between these extremes there are any number of variations.

further distinction of labiate and personate corollas, the first term signifying (with him) those with the lips well separated as in the *Ocimums (tulsi)*; the second, those with the mouth closed, as in the English snapdragon (*Linaria*). But I think it better not to make this a distinguishing mark, though, of course, this difference must be noticed.

The orders represented in W. India, which have, partially or entirely, flowers of this sort, are the following:—

Scrophularineæ, *Orobanchaceæ*, *Gesneraceæ*, *Bignoniaceæ*, *Pedaliaceæ*, *Acanthaceæ*, *Verbenaceæ*, *Labiataæ*. When these orders are described, it will be seen that they all have special characteristics of their own though agreeing in the common characteristics already mentioned.

1. *Scrophularineæ* contains a large number of genera. All these known in W. India (except one shrub found only in Sind) are herbs, the greater part rather inconspicuous. The leaves are either opposite or alternate, the stems generally round, the fruit generally a many-seeded capsule.

2. *Orobanchaceæ* is a small order of leafless parasitic plants that can scarcely be mistaken for anything else. The whole plant is generally of a uniform hue, most often brown or purplish, the stem has a few scales on it which could scarcely be mistaken for leaves. There are only six species in W. India.

3. *Gesneraceæ* is also a very small order, the five species known in W. India being all rare. They are herbs or undershrubs with characteristics very similar to those of *Scrophularineæ*.

4. *Bignoniaceæ*. Trees, mostly large ones, and conspicuous generally by the large size of leaves, flowers, and fruit, the latter being pod-like. None of these trees can be called common, but all are remarkable. There are some well known climbing Bignonias in gardens.

5. *Pedaliaceæ*. A very small order of herbs, of which only two are found in W. India, both described below.

6. *Acanthaceæ*. Mostly shrubs, very many of them very strong smelling and viscid, like the well-known *Karvi*. The flowers in this very large order are most often crowded together in spikes or racemes, surrounded with very many bracts. The leaves are always opposite.

7. *Verbenaceæ*. Mostly trees or shrubs, the subordinate characteristics not very clearly defined.

8. *Labiata*. Aromatic herbs (rarely shrubs), with square stems, opposite leaves, and an ovary composed of four deeply-separated lobes, which can always be seen at the bottom of the calyx tube by pulling off the corolla. These develop into a fruit of four one-seeded nuts (very small) remaining at the bottom of the calyx tube. This peculiarity of ovary and fruit distinguishes the order from all others (except some genera of *Boraginæ*, which in other respects are quite different), and there is no order more easily recognised. To it belong all the mints, lavender, rosemary, sage, salvias, &c. Now of these orders what has been said above of Nos. 2, 3, and 5 will be sufficient for the beginner. As to the rest, if he finds a *tree* with this peculiar form of corolla and arrangement of stamens he will know that it belongs to order 4. If a *shrub* with flowers closed in with many large bracts it probably belongs to No. 6. Any other shrub probably to No. 7. If a square stemmed aromatic herb, with the peculiar ovary mentioned above, it certainly belongs to No. 8. Any other herb probably to No. 1, though each of the other orders, except No. 4, has some herbs. Thus the field for identification is very much narrowed.

It only remains to give a list of the common or very conspicuous species found in W. India belonging to these orders, and possessing the peculiar form of corolla and arrangement of stamens we are concerned with; for it must be remembered that in the large orders here given there are a good many plants which have either a regular corolla or else five or two stamens, or in some cases four equal ones. With these we have no concern in the present arrangement, but in two genera of *Acanthaceæ* here given the upper lip is wanting.

[*Note*.—In these descriptions, D. signifies Dalzell and Gibson's Bombay Flora; H. Hooker's Indian Flora; Native names in Italics.]

Bilabiate flowers with didynamous stamens.

I.—ORDER SCROPHULARINÆ.

1. *Linaria*,—Corolla with mouth quite closed, and a spur below the lower lip.

L. ramosissima,—A smooth delicate plant much branched and prostrate; flowers yellow, solitary, long-stalked; leaves triangular, more or less lobed. Deccan and elsewhere. Throughout India, H.

Any one would recognise this from its likeness to the English snapdragons, both of garden and hedge.

2. *Lindenærgia*,—Calyx bell-shaped; corolla with upper lip broad, lower 3-lobed.

L. urticæfolia,—A very downy plant, growing generally on walls; flowers yellow, solitary, or in pairs, the throat spotted; leaves small, ovate, serrate. Throughout India H.

3. *Stemodia*,—Calyx more divided than the last; corolla as in the last, but the throat nearly closed.

S. viscosa,—An erect, hairy, sticky, strong-smelling plant with square stems; flowers dark blue; leaves stem clasping, ovate or fiddle-shaped. Common in Deccan, Konkan and Guzerat, especially on rice fields in cold weather.

[Note.—In some respects this looks like one of the Labiatae, but a glance at the ovary and fruit will show that it cannot belong to that order.]

4. *Torenia*,—Calyx tubular, winged or keeled; mouth of corolla dilated, lips far apart.

T. asiatica,—Plant with dark blue or violet flowers, the lips of different shades; leaves triangular, crenate. This is the plant often called “Belgaum Violet”—not common, I believe, except in gardens. There are two other species still less common and smaller.

5. *Vandellia*,—Very small herbs; upper lip of corolla broad; concave, lower 3-lobed, spreading; upper pair of stamens arched, and the anthers joining.

V. crustacea,—A diffuse smooth plant, with square stem; flowers light purple; leaves oval, coarsely crenate. Common, but inconspicuous. Throughout India H.

6. *Striga*,—Small rough herbs, usually with square stems; calyx much ribbed; corolla tube bent.

S. euphrasioides,—Flowers mostly axillary and solitary, sometimes spiked, white, with a superficial resemblance to the English Euphrasia (Eyebright); leaves linear, rather long; bracts lanceolate, longer than the calyx. Common. Throughout India, and sometimes growing two feet high. H. Another species, *S. orobanchoides*, very common in the S. Konkan, is parasitic on roots of other plants, and is of a reddish hue all over.

7. *Ramphicarpa*,—Corolla tube long and slender; lobes nearly equal; lips obscure; capsule beaked.

R. longiflora,—A small pretty plant, with pure white flowers, very large for the size of the plant, generally solitary; leaves divided into many linear or thread-like segments. Very common in S. Konkan, growing in grass, and apparently all over the Peninsula of India. H.

8. *Sopubia*,—Corolla short tubed, broad mouthed ; lobes much as in the last.

S. delphinifolia,—A handsome plant with pinnatifid leaves and filiform segments ; flowers axillary, solitary, or in pairs, large rose-coloured, the throat darker.

Konkan and Guzerat. Throughout the peninsula. H. He makes it grow as high as three or four feet. I have not seen it more than half that.

[Note.—In the two last the much divided leaves, very uncommon in these orders.]

II.—ORDER OROBANCHACEÆ.

1. *Æginetia*,—Calyx spathaceous, deeply split in front ; corolla tube broad ; lobes nearly equal and very small.

Æ. Indica,—Dull purple all over, like a tobacco pipe standing on end, the large curved flower forming the bowl. Konkan, Khandalla, &c. Throughout India. H.

2. *Orobanche*,—Flowers in spikes or racemes ; upper lip of corolla erect ; flower 3-lobed.

O. Indica (*Phelipæa* I., D.)—Dull purple or blue, growing on tobacco and mustard plants.

III.—ORDER GESNERACEÆ.

Gloxinias and Achimenes, in gardens.

IV.—ORDER BIGNONIACEÆ.

As these are all trees which can be easily recognised by their native names, it seems unnecessary to give descriptions of them here.

1. *Oroxylum Indicum* (*Calosanthus* I., D.)—*Taitu*. Konkans and Ghauts. Throughout India. H.

2. *Dolichandrone fulcata* (*Spathodea* f., D.) *Netasing*, *Marsingi*. Guzerat, Konkan and S. M. Country.

3. *Heterophragma Roxburghii*, *Waras*. Common on the Ghats and elsewhere.

4. *Stereospermum chelonoides*. (*Heterophragma* ch., D.)—*Pádel*, *pádri*. Ghauts and S. Konkan. Through moister India. H.

5. *S. xylocarpum* (*Bignonia* x., D.)—*Kharsing*, *bersingi*. Ghauts, Konkans, &c.

6. *Millingtonia hortensis*,—Native of Burma, but planted about the roads in Poona. A grand tree.

V.—ORDER PEDALINEÆ.

1. *Pedálium*,—Capsule hard, spinous, indehiscent.

P. murex,—A low thick-stemmed succulent herb ; flowers small, yellow, solitary ; leaves oval, obtuse, sometimes slightly lobed ; fruit ovoid, with 4 conical spines from the base. *Gokru*.

Sandy shores of Guzerat, Kattywar, and N. Konkan.

2. *Sesamum*,—Capsule without spines, 2 to 4-valved.

S. Indicum,—Erect, slightly hairy, flower very like foxglove, varying in colour from purple to rose and white, with an offensive smell ; capsule oblong, erect. Commonly cultivated. “Til tilli, jinjali.” (“Open Sesame”—Arabian Nights.)

3. *Martynia diandra*,—An American weed with large cordate glutinous leaves and handsome flowers, much like the last ; is pretty well naturalized. *Vinchu ákara*.

VI.—ORDER ACANTHACEÆ.

1. *Thunbergia*,—Climbers ; * calyx very small, covered by 2 bracts ; lobes of corolla nearly equal ; capsule round below, beaked above.

T. fragrans,—A pretty climber with rather large pure white flowers, and large ovate bracts ; leaves oblong, acute, slightly lobed. The minute calyx has 12 teeth, which is an easy distinction. Konkans pretty common. *Eri-vel*.

T. grandiflora and *T. alata* are two garden species, the first one of the largest climbers, with very large and beautiful pale blue flowers ; calyx a mere ring ; the latter much smaller, has bright buff flowers, with a dark throat, often called “Black-eyed Susan.”

2. *Hygrophila*,—Herbs ; calyx segments narrow, one pair of stamens, sometimes imperfect or obsolete.

H. serpyllum (*Physichiluss*, D.),—A small creeping plant, covered with stiff grey hairs ; flowers rather large for the size of the plant, bright blue, the lower lip blistered and spotted with white ; leaves nearly round. Konkans, &c. At Lanowlee, in the cold weather, the rice-fields are covered and coloured with this. *Rán-te-wan*.

H. spinosa (*Asteracantha longifolia*, D.),—A stout rough plant, with blue flowers, sessile, in whorls of lanceolate leaves and thorns. Lower lip of corolla with a yellow spot. Very common in swamps. Throughout India. *H*.

H. salicifolia is very like this, but smaller every way. Grows in the same situations.

* Several species of erect shrubby growth are cultivated in gardens.—G. C.

3. *Ruellia*,—Herbs or undershrubs; bracts larger than the calyx; corolla lobes about equal; capsule solid below, bearing large thin seeds in the upper part.

R. prostrata (*Dipteracanthus dejectus*, D.)—Prostrate or straggling and climbing in hedges; flower solitary or nearly so, purple or blue bell-shaped; leaves long, petioled, ovate, often acute; bracts like the young leaves.

Very common in Guzerat and the Konkan. (Query, Deccan?)

4. *Strobilanthes*,—Shrubs or herbs; calyx deeply 5-cleft; corolla tube bulged out.

Note.—H. has no less than 146 species of this genus, and it is exceedingly difficult to make which our Bombay species ought to be. But I have very strong authority for identifying the only very well known species as

S. callosus,—which includes D.'s *S. Grahamianus*, the late shrub so common at Mahableswar and known as *karvi*, very strong-smelling and viscid; flowers in large thick spikes, large and handsome, deep blue, hairy within.*

5. *Blepharis*,—Rough creeping or prostrate plants, with leaves in whorls and crowded bracts; corolla with short fleshy tube, upper lip wanting, lower 3-cleft.

B. asperrima,—Straggling along the ground with weak straw-coloured stem, every part covered with bristly hairs; flowers blue or white, sessile; bracts whitish with green veins; sepals four in two unequal pairs. Very common on the Ghats, less so in the Konkan. *Pahadiatgan*.

B. boerhavifolia,—Flowers white, pale blue or pink, with yellow spot on the lip; bracts edged with bristles; leaves in fours, lanceolate. Common in Guzerat and elsewhere.

6. *Acanthus*,—Sepals and corolla as in the last.

A. ilicifolius (*Dilivariai*, D.),—Small, handsome, thorny shrub, with leaves like holly, prickly, and large bright blue flowers; corolla lip nearly entire; bracts small, ovate. *Nigur*. Very common in salt marshes; sometimes called Sea holly, but not to be confounded with the English plants of that name. (*Eryngo*.)

* This is the early flowering showy species common on the Ghats flowering in October.

S. perfoliatus, with thin spikes glandular bristly narrow bracts, and dark blue or purplish flowers: flowering in January, and

S. isiocephalus, with thick heads, broad bracts and dull white flowers, flowering in January, are both very common in the ravines at Khundalla. Both are very viscid and strong smelling.—G. C.

7. *Barleria*,—Shrubs or large herbs with showy flowers; sepals in opposite pairs, the outer pair much the largest; corolla lobes 5, often divided 4 and 1, two of the stamens often imperfect.

B. prionitis,—Shrubby and thorny; flowers spiked or whorled, rather large, buff, soon falling off; larger calyx segments ovate, spinous, pointed; bracts subulate; leaves narrow at both ends. *Kholeta*. Very common.

B. montana,—Large smooth plant; flowers large and beautiful, solitary, sessile rose-coloured, mauve or blue: smaller calyx segments and bracts very small, linear.

Bombay, Konkan, and Ghats. Not uncommon.

There are several other species, one with blue another with white flowers, both very large; but none are at all common but the two given above.

8. *Asystasia*,—Undershrubs; sepals narrow; corolla lobes five, about equal.

A. coromandelliana,—Erect or procumbent, much branched; flowers in long, loose, one-sided racemes, yellow, blue or pale purple; bracts linear; leaves ovate, acute. Common.

A. violacea,—All softly hairy, with large violet flowers, the lower lip dark purple and spotted, is very doubtfully distinct from the last. Dr. T. Cooke calls it very common at Matheran, less so at Mahableswar.

9. *Lepidagathis*,—Calyx of two large and two or three small segments; corolla tube swelling in the middle; limb decidedly 2-lipped.

L. cristata,—Prostrate hairy leaves; calyx segments and bracts all bristle pointed; flowers in dense round heads near the root, pale, streaked darker.

Guzerat, Deccan, &c.

Note.—There are many common members of this order which have only two stamens, and are therefore not mentioned here.

VII.—ORDER VERBENACEÆ.

1. *Lantana*,—Straggling shrubs; with small flowers in heads; calyx small, entire or slightly lobed; bracts large.

L. camara,—An American plant, now very common everywhere, straggling and climbing, with square prickly stems and pretty flowers in roundish heads, pink, orange or lilac, and of many shades in the same plant. The whole smells very strongly of black currants.

* The pink and white varieties doubtless belong to an indigenous species.—*L. indica*, *Romb.* (*L. alba* D.).—G. C.

2. *Lippia*,—Like the last, but fruit a capsule instead of a drupe.

L. nodiflora,—A small creeping plant, tough and hairy ; flowers in ovoid heads, very small, pale, arranged so closely as to look as if on a common receptacle (*Compositæ*) ; bracts many, overlapping. Common in grassy places. Abundant throughout India.

3. *Premna*,—Trees or shrubs ; flowers small, often polygamous. calyx cup-shaped, surrounding the drupe.

P. coriacea,—(*P. scandens*, D.)—A large strong smelling climber ; flowers greenish white, in large panicles ; one of the lobes of the corolla much larger than the rest ; leaves very large, pointed, shining. *Chámbári*, *Dhansar*. Konkan and Ghats.

P. latifolia,—Is an erect shrub, with flowers and leaves very much like the last. Common near the sea, and called by the same name as the last.

4. *Gmelina*,—Flowers large ; corolla tube short ; calyx bell-shaped.

G. arborea,—A tree hairy in most parts ; flowers brown and yellow, in racemes ; lobes of corolla broad, roundish, curled back, the lower are much larger and protruding. *Shewan*, *Kumar*, *Gumbá*. Konkan. Less common in Deccan.

5. *Vitex*,—Flowers small ; calyx as in the last, but more or less enlarged in fruit ; corolla decidedly 2-lipped.

V. Negundo (*V. bicolor*, D.)—Tall shrub, leaves 3 or 5-foliate, grey, leaflets lanceolate, the underside with the branches white and downy ; flowers in terminal panicles, lilac or light blue. *Nirgund*.

I should call this the commonest shrub in the Konkan : very common also on the Ghats.

VIII.—ORDER LABIATÆ.

1. *Ocimum*,—Flowers in whorls of 6 to 10, racemed or spiked ; calyx with upper tooth very large, running down into the pedicel ; corolla tube short, upper lip equally 4-lobed.

O. basilicum,—Erect, nearly smooth ; spikes long ; flowers white, pink, or purplish. *Sabza*. "Sweet basil." Commonly cultivated

O. sanctum,—Softly hairy, the whole plant often purplish ; corolla very small, pale purple, hardly longer than the calyx. *Kála tulsi*.

Ram tulsi is *O. gratissimum*.

2. *Lavandula*,—Leaves much divided;* flowers in spikes; upper lip of corolla bifid, lower trifid.

L. Burmanni,—A tall plant; leaves bi-pinnatifid; segments linear; flowers dark blue or white, in dense spikes. *Gorea*. Common in the Deccan.

L. Gibsoni (*L. Perottetii*, D.) is like this but more hairy, and the leaves pinnatifid. It is found only in the hills above Sattara, and one or two similar places. Both these are so like the English garden lavender, both in appearance and smell, as to be at once identified.†

3. *Pogostemon*,—Flowers very small, many together in whorls, spiked; corolla lobes 4, lower usually the largest; filaments bearded and exserted.

P. parviflorus,—Strong, coarse, half-shrubby plant, mostly smooth, with purple stem and branches; flowers whitish, in close pyramidal heads. Has a strong smell of black currants. *Pangli*. S. Konkan. Very common. There are several species so much alike as to be not easily identified. *Pach*, commonly cultivated, is *P. patchouli*.

4. *Dysophylla*,—Small plants with generally whorled leaves; flowers dense, in spikes; corolla equally 4-lobed.

D. stellata,—Slightly hairy; leaves linear, 5 to 7 in a whorl; flowers red or purple. *Marvú*.

S. Konkan, Belgaum, &c. Very abundant on rice fields in the cold weather.

H. gives eight species of these, but there is a great similarity between them all. One, *D. myosuroides*, found at Mahableshtar, *Shewal*, has the leaves not whorled.

5. *Colebrookia*,—A densely woolly shrub; corolla lobes 4; about equal.

C. oppositifolia,—Leaves in threes, elliptic, narrow at both ends; flowers minute, dingy white, in very small dense spikes, suggestive of Indian squirrels' tails. *Báhmání, dasai, dasari, kajhar*. Very common on the Ghauts and Konkan hills.

6. *Anisomeles*,—Tall, coarse herbs; upper lip of corolla erect, entire, lower broad, spreading.

A. Heyneana,—More or less hairy all over, stem and branches acutely 4-angled; leaves ovate, crenate; flowers of no beauty, white

* In Indian species.—G. C.

† The leaves, however, are very different.—G. C.

or greenish, partly tinged with pink, in one-sided cymes. Very common in Salsette and the Konkan generally. *Chaudhára*.

A. ovata,—A large handsome plant, with soft-downy leaves, ovate, crenate; flowers in dense whorls, spiked light with deep purple lower lip.

Common in Guzerat, Deccan and Konkan.

7. *Leucas*,—Generally hairy or woolly plants of no beauty; flowers white; upper lip of corolla erect, hooded, lower spreading, with very large middle lobe; calyx with 6 to 10 teeth.

L. stelligera,—A tall plant with flowers in large dense whorls; calyx with 10 soft and spreading teeth. Ghaut, Konkan, &c. Very common at Matheran. *Burumbi*, *Guma*.

L. aspera,—About 6 inches high, rough and hairy; whorls of flowers small and dense; calyx curved, with oblique mouth and short teeth. *Tumba*.

Common on the seashore, plains of India. H.

L. linifolia,—Very like the last, but larger and nearly smooth; leaves linear or oblong.

This is the common species of cultivated fields in Guzerat, Deccan and Konkan.

There are several other species less common, one only.

L. biflora,—With flowers not dense. The genus is very easily known.

8. *Leonotis*,—Flowers in dense axillary and whorls, with many slender bracts; upper lip of corolla long hooded, lower very small, spreading, concave; calyx 8 to 10 toothed.

L. nepetifolia,—A strong annual 6 to 8 feet high; flowers orange coloured, hairy; calyx teeth bristly; leaves ovate, crenate. *Matissul*, *ekrí*. A doubtful native, but tolerably common and very conspicuous.

In conclusion, I ought perhaps to say that I assume that any one wishing to identify a plant by the aid of these notes will first set to work to make out the order to which it belongs, then the genus: will, in fact, work downwards from the greater divisions to the lesser. This method teaches one much more than merely running through all the species in the hope of hitting on the identification by some one or two marked features. And speaking more generally, I should say that I hold to the natural orders most faithfully, only wishing that other descriptive helps should be added to aid the student in what must always be to the beginner the very difficult

work of identification. I should also add that those who are acquainted with the botany of the whole Presidency may very possibly think that the species chosen for description are not in all cases the commonest or most conspicuous. On this point opinions will no doubt vary, but it must be remembered that this is a mere sketch, and that I claim nothing but a very fallible degree of accuracy.

NOTES ON BIRDS OF QUETTA.

By A. T. H. NEWNHAM, B.O. S.C., F.Z.S.

It is with some reluctance, seeing how little I have to say, that I have commenced to put to paper the few observations I was enabled to make during a short residence of three or four winter months in Quetta; but as it is by an accumulation of such scraps that we arrive at definite results, I shall endeavour to comply with the request of our Honorary Secretary to write something for our Journal.

This last winter in Afghanistan was comparatively a mild one, and in consequence the ducks were somewhat late in putting in an appearance, so that it was not until the end of January that one heard of anything like decent bags being made. A wonderful shot was made by a sporting Colonel in the garrison, which, I think, deserves recording. He came suddenly upon a bunch of six ducks round the bend of a stream, and firing as they rose brought down the whole lot. Presumably they must have all risen in one straight line with their heads in a row, but it was a singularly lucky shot.

Teal and gadwall are not unfrequently met with in the river beds, but the other species of ducks seemed to keep more to tanks and larger sheets of water. I had sent to me no less than three specimens, all drakes, of that uncommon and beautiful little duck, the Smew (*Mergellus albellus*), and a very tedious job I found it skinning them, as they were mere balls of fat.

Sand Grouse were not so plentiful as they should have been, and were exceedingly shy: the commonest sort was the Imperial (*P. arenarius*). Of the Pin-tailed Sand Grouse (*P. alchata*) I only saw one flock, and that was quite close to the Fort. They were the first that I had ever seen, and I could not make them out at all at first, but took them for plover of some sort. They flew at a

tremendous pace, faster even than the Imperial, and during their wheels in the air showed a clear white expanse of underwing. They were endeavouring to settle to feed, but were persistently bullied by the ravens, and obliged to move on. I was thus enabled to get a couple of good specimens as they came over me. I could not find out that the Sand Grouse up there had any fixed drinking place, as in Cutch and Sind: probably there was too much water about, and they drank wherever the fancy seized them.

I saw part of the skin of a Sand Grouse shot by a Warrant Officer of the Garrison, which, I think, must have belonged to *P. lichtensteinii*, which does not seem to have been recorded from S. Afghanistan before. A fair number of Woodcock (*S. rusticola*) were shot in or about Quetta this last winter. The first fell to my lot on November 11 (rather an early date for them), and the same day I saw two others. The exact number that were shot in the season I have no account of, but I should say between twenty or thirty. I heard of one man shooting as many as six in one day, but accounts of shikar must be received with caution. They invariably come in about the beginning of December, that is, the main body of them, and either move on or get exterminated; anyhow, they are not often seen after January. There were one or two favourite spots for them, but as often as not they were put up out of small gardens, and I even heard of one having been knocked over with a stone by a Tommy in the cemetery a year or two before.

There were three Solitary Snipe (*G. solitaria*) shot this last season, all in the Surkab, Pisheen, a broad strip of marsh and tamarisk bushes, between two ranges of hills. Unfortunately I could not succeed in getting hold of a skin for preserving before they had been plucked. In the same place was procured a single specimen of the English Water Rail (*R. aquaticus*), which I do not see recorded in Col. Swinhoe's list of the birds of S. Afghanistan.

Chukor (*C. chukar*) and See-see (*Ammoperdix Bonhami*) are the other items which help to make up the scanty bags, generally made within a radius of fifteen miles of Quetta. By all accounts the last severe winter killed off a great number of these birds, so that now they are comparatively scarce. The See-see is extraordinarily fond of his own particular spot of ground, and you may rely upon finding him there time after time. As the winter advances, however, they disappear somewhere, where, I could never satisfactorily make out, but probably into lower lying country. About the migration I

shall say nothing, as I did not arrive in time for the autumn departure and left before their return, but the following is a list of some of the migrants, which remained the winter through in Quetta :—

Wagtails (*M. alba personata*), Redstart (*R. erythronota*), Black-throated Thrush (*T. atrogularis*), Wheatears (*S. Morio, deserts*), Bunting (*E. leucocephala, huttoni*). *Accentor atrogularis*, Starling (*S. vulgaris*), Larks (*A. cristata* and *M. bimaculata*, Pipit (*A. trivialis*).

One of the features of an Afghan landscape is the enormous number of ravens (*C. Lawrenci*). They sit everywhere uttering their peculiar notes, one a deep guttural bell-like note, and the other much more musical, resembling the noise made by pouring wine out of a bottle. They come into Quetta to roost in enormous numbers, as there are no trees worthy of the name to be found outside, but before roosting they sit about on the ground in flocks, perfectly blackening the ground where they are. In the early morning before sunrise they may be seen quitting their roosting-place to disperse themselves all over the country in quest of food.

In company with the latter, or sometimes associating with pigeons, fly flocks of the Hymalayan Chough (*Fregillus graculus*) with their peculiar cry and wild eccentric flight. The familiar English magpie too (*P. rustica*) is exceedingly plentiful at Pisheen, though I never saw one at Quetta, and may be seen in the Surkhab by sixes and sevens at a time, flitting from rock to rock.

I was rather surprised to see one day, so late as December, a common green parrot (*P. torquatus*) flying overhead. I had never heard of them being found so far north before, so concluded it must have been an escaped bird. However, a few days later, I saw a pair flying together, apparently enjoying the severe weather, and these had not the appearance of recently caged birds at all. It would be difficult to say what they could have found to eat, as the trees were perfectly bare at the time, unless they subsisted on what grain they could pick up in the bazaars.

One small bird which I saw up there particularly attracted my attention, and though I tried very hard to procure a specimen for identification, I was unable to do so, chiefly owing to its restless habits, and to the fact that it went over the worst ground on the side of the hills which it could have possibly picked out. Perhaps some of our readers may be able to recognize it from my descrip-

tion, viz., about the size of a Stone Chat, and possessing the same habits, of a uniform greyish mud colour, with black-tipped tail and a little white about the head. The thing, however, which attracted my notice most of all was its power of imitation. I heard it myself imitating most loudly and distinctly the common grey partridge. In fact, the first time it completely took me in. A man in the Engineer Department there informed me that he had also heard it imitate a puppy squealing so truthfully, that his dogs became quite excited and began hunting about for the supposed puppy in distress. It then commenced crying like a peewit. It should come from some country where the grey partridge is found, as it could not very well have picked up the cry of the latter in Afghanistan, where the grey partridge does not, as far as I know, occur; but at the same time I do not remember ever reading about powers of mimicry in any bird answering to the description of this one, which is found in the same localities with the grey partridge (*O. pondicerianus*).

Another beautiful little bird, not uncommon in the rivers in Afghanistan, is the Red-winged Wall-creeper (*Teichodroma muraria*), an Alpine bird. It has wings of a lovely crimson and black, the first three primaries being strikingly spotted with white. It is very confiding and will run up a bank in its quick jerking way within a few feet of you, uttering its shrill pipe.

I will now conclude these few observations with the hope that I may be able at some future period to contribute something of greater interest than the bleak hills of Afghanistan can afford.

INSTANCE OF TERATOLOGY IN THE BRINJAL OR EGG-PLANT (*SOLANUM MELONGENA*).

(See illustration.)

TRIPLE FRUIT FROM A SINGLE FLOWER.

THIS form of teratology is not common. The pistil—the part of the flower which develops into fruit—is more subject to suppression than to multiplication. This is believed to be due to the position of the pistil in the centre of the flower (where it is subjected to pressure) and also to the fact that it is the last developed of the parts of the flower. Instances, however, do occur in which the carpels are increased. In the present instance there seems to be a

simple multiplication, so that the calyx, instead of holding in its cup *one* fruit, has *three distinct ovaries* which are developing into fruits.

Curiously enough, Sir J. D. Hooker says that the *Solanum Melongena*, when it escapes from cultivation, often becomes intensely prickly, and the fruits on the single flower stalk may vary from *one to five* ! This looks as if a multiplication of fruits was, in the case of the Brinjal, a result of degeneration.

India, with its exuberance of vegetation, is probably teeming with instances of teratology. Some of the readers of the N. H. S. Magazine might send specimens, or descriptions of specimens, which may occur in their own experience. The double cocoanut is known to occur, and whether there is simply an increase or a diminution of the ordinary structures of the plant, or a change into some other structure, we are assured that many instances of teratology might be sent to our Honorary Secretary during the next few months, which would show how common are the various instances of teratology which are to be found in this country.

D. M.

SPORTING RAMBLES ROUND ABOUT SIMLA.

BY J. C. ANDERSON.

(*Read at the Society's Meeting on 16th January 1889.*)

I WILL suppose that you have a short holiday in October or November and find yourself at Simla. The first want you will feel—at least I always did—was to get out of it without unnecessary delay: those distant snows and forests are too alluring. Some preparations must, however, first be made. In the first place, you must have dogs. Any dog with a nose will do, and it is strange how many dogs have noses, though few of them know it. A fox-terrier, or bull-terrier, trained to use his nose and thoroughly well in hand, is as good for this work as a spaniel or setter,—better I think in many respects,—as he is lighter and not so easily fatigued on those steep rocky hillsides; on the other hand, it must be admitted, he has usually a way of helping himself to pheasant that has to be guarded against. The best dog out of a regular pack of all sorts that it fell to my lot to see was a tiny, mean-looking, yellow *pai*—the most veritable cur you ever set eyes upon—and yet with a nose that was

truly marvellous, combined with a judgment that would have adorned the bench. A shikaree, too, you will want—a man who can work the dogs, and who has some knowledge of the country and the sport to be found there. Tents, of course, if you are going to leave the road and the bungalow. They must be small and light, and, like all the rest of your luggage, capable of being carried on mules or on men's backs. If you are going for a short holiday only, with no definite plans made for you by some friend on the spot, I should advise you to stick to the Thibet and Hindoostan high road (a pathway from 3 to 12 feet in width), on which for over 100 miles there are good bungalows, distant some ten or twelve miles from each other. Shooting all that you can reach from these bungalows on either side of the road, you may, if you are keen and in good trim, cover a great quantity of very fairly good ground, and you will be incomparably more comfortable than you could be in tents, with the thermometer at nights well below freezing-point. A servant, too, you must have who can cook, and has some experience of marching in those districts and knows the language of the people. And, lastly, a man who can skin birds. Such a man can almost always, I believe, be got in Simla for a salary of Rs. 15 or Rs. 20 a month, and it adds enormously to the pleasure of a ramble in a new country to be able to collect specimens as you go along. Here before you are some of the birds which I collected on my first visit to Simla, and many more might have been collected. It is scarcely worth while in October or November taking a rod with you, but there is no harm in taking a small trout rod, a few flies, and one or two small flying spoons, which you can get at Luscombe's, of Allahabad, better than anywhere else that I know of. I have not fished myself, being told that at that time of the year it was useless; but a forest officer, whom I met last November, told me he had just caught several smallish fish in the Giri in the direction of the Chor (a big hill not very far from Simla),—I think he said with a fly. If your visit should be in May or June, certainly take your fishing tackle. Both in the Giri to the east and the Sutlej to the west the Indian trout (*Barilius bola*) and mahseer (though not of any great weight) are to be caught and give good sport. So at least I am informed on the very best local authority. At that time of the year, when the upper rivers are full with the melting snow water, the fish ascend the smaller, tributary streams, and descend when the water begins to run fine again at the end of the rains, say in

September and October, after which the fish must be looked for in the bigger waters in the plains below. I would advice you to take a rifle, though it is quite possible you may find little or no use for it. It depends, of course, a good deal on the direction in which you go, and how far. If you are simply rambling round about Simla, which is all that I am now supposing you to intend to do, and nearly all that I can myself pretend to have done, you may not possibly see a four-footed creature bigger than a jackal or a fox. By the way, a Simla fox (*Vulpes montanus*) in autumn (and even more so in winter, I believe) is a beautiful creature. It has, as you see here, a lovely coat and a noble brush : it makes a very handsome rug when properly mounted. There are, however, bears there, and in some places a good many. I have heard of as many as five being shot in one day close to the road. I mean the Himalayan black bear (*Ursus tibetanus*); the brown bear of Cashmere (*Ursus isabellinus*) is very rarely, if ever now, met within this neighbourhood, though I believe there was a time not so very long ago when it was not so scarce. The Barra-singh of Cashmere (*Cervus cashmirianus*) too is another animal which used occasionally to be seen in this district, but has been crowded out by the multiplication of guns. Goral, however (*Nemorhaedus goral*), a small species of mountain goat you will find in some places, and those not far from Simla, pretty plentifully, I believe. I have heard local sportsmen speak disparagingly of goral shooting as very tame work, and, to judge by some accounts of it I have heard, it must often be so. My own experience was as small as it well could be, but the one I saw and shot, on the only occasion I ever went after goral, gave me as pretty an afternoon's walking and climbing on a steep hillside among oaks and ferns and rhododendrons and grand grey crags as one could well wish to have. If your ladder is low, you will not despise goral; a laddie of goral is by no means to be contemned, even if you do not strictly follow the advice a serjeant pensioner gave me, to be "sure and hang it three weeks, Sorr." Tahr and burrohl and even ibex you may meet if you go far enough; but I will not say how far that may be. I never saw any of them though I have come across pugs (on a retired part of Hattoo, I think), which doubtless belonged to one or other of them. I could not make out from my shikarce to which. It is not your rifle then you must depend upon for your sport, but your gun. For this you may always find some occupation pretty well anywhere in

that neighbourhood. If you must have big bags, you will almost certainly be disappointed ; if you are content with a grand day's walk and a moderate bag, hardly and honestly won, you need scarcely ever be so ; and, of course, it is to the pheasants that you will chiefly look to provide you with your amusement and fill your larder. Wherever there are trees or even bushes, though it be on the very roadside, you feel you are not quite safe from one or other of that game and handsome family. The pheasants that you may expect to meet at this season of the year are practically four only, unless, indeed, you go somewhat further afield than I am now contemplating your doing. These are the monal (*Lophophorus impegamus*), the koklass or pukras (*Pucrasia macrolopha*), the cheer (*Phasianus wallichi*), and the white-crested kalij (*Euphocanus albocristatus*). The handsome jewar or so-called "Argus Pheasant" of that region (*Cerionis melanoscephala*), one of the tragopans (we had a live specimen in these rooms lately), is still, I believe, to be met with in the higher regions of forest, somewhat more remote from Simla, but not except quite as an exception within the regions I am now considering. It is a shy bird apparently, of somewhat meditative, if not gloomy disposition, favouring the darkest depths of the remotest forests. Yet curiously, as pointed out by more than one writer on the subject, it seems to be the most easily tamed of all the Himalayan pheasants ; while the kalij, which in its wild state seems scarcely happy far away from the sound of the human voice, is the most difficult.

The monal and the koklass, and specially the former, are distinctly forest birds, loving the dark dense forests of deodar, juniper, and yew, while the cheer and the kalij prefer somewhat more open ground interspersed with woods of pine oak and rhododendron, with a thick undergrowth of bushes, ferns and grasses. The monal I have not found at a much lower elevation than 7,000 feet ; the koklass seldom below 6,000 feet ; from 5,000 or lower to 7,000 seems to be the favourite region of the cheer and the kalij. Though all four birds are now, I believe, universally regarded as pheasants, you will see from the specimens I have before me that they differ from one another very considerably in character. There is no mistaking the cheer with his typically long tail for anything else than a pheasant. A cock cheer in form and feature, though not in colour, differs very slightly from the cock pheasant of our English covers, and is about the same weight, say $3\frac{1}{2}$ lbs. The koklass is

evidently a near relation, being a typical pheasant in all respects, save that he is wanting in the long tail feathers. But the moonal, with his gorgeous blue, green, copper, and bronze tints, his peculiar upright crest, and his compact thickset body, and strong, short legs, evidently adapted for digging, is obviously as nearly related to the peacocks as he is to the pheasants; while you have only to look at the tail of the kalij to see his relationship to the next sub-family at the other end of the scale, *viz.*, the gallinæ—comprising the jungle fowls, firebacks, &c. All four birds seem distinctly to prefer shade to sun and damp to dryness. The neighbourhood of running water seems almost an essential with all of them. In short, such as the fern is in its choice of locality, so is the pheasant; the two are evidently firm friends. As with trout and many other fish you are pretty sure to take day after day behind the same stone or in the same eddy, so it was I found, not always for any apparent reason with these pheasants. There were certain spots, for instance, on the road from Narcanda to Bhagi (which, by the way, passes through one of the grandest pieces of forest scenery I suppose to be seen on any roadside in the world, where the deodars must some of them be quite 200 ft. high, with their dark sombre green veiled in many cases from top to bottom in the flame-coloured leaves of the virginia creeper). There were certain spots on this road, where in my visit of three years ago I was sure day after day to find a bird or two in spite of the fate that had overtaken their predecessors at the same spot it might be only the previous day. On visiting the same locality last November, there, in the very same spots, I nearly always found birds. The moonal, the koklass, and the kalij seem to spread themselves pretty indiscriminately over the area where the conditions they require are to be found. It seems curiously otherwise with the cheer. One little valley may hold cheer, and a dozen all round, where apparently the conditions are precisely the same, may not hold a single one. I have heard of residents of Simla shooting regularly for years together all round the neighbourhood, and never so much as seeing a single cheer, and then subsequently coming on them by chance one day in some place not previously shot over though perhaps quite close to Simla and always thereafter finding them in the same place year after year. I was fortunate enough on this last visit to Simla to be shown one of these haunts of the cheer, from which these three specimens I have here were secured. The ground corresponded very accurately

with the description of the favourite locality of the cheer given by Messrs. Hume and Marshal in their well-known work. The hillside on which they were found was composed of a number of little cliffs one above the other, each perhaps from 20 to 30 feet high, broken up by ledges on which one could barely walk, thickly set with grass and bushes, and dotted sparingly with more or less stunted trees, with curious roots hanging down the little cliffs and long trailing arms of scarlet creeper. I had a red setter and three spaniels with me. The setter was put to range over the whole hillside; men were stationed at various points to mark down the birds while we sat on a knoll opposite and looked on, a deep ravine lying between. It was a pretty sight to see the dog working half-way up the hill. Soon there might be seen, scuttling up hill at an amazing pace, across the little open glades between one clump of brushwood and another, a family party of some five or six cheer, their heads down and long tails drooping. The dog soon overtook and flushed them, and then all eyes were wanted to mark down each bird. The birds have pitched in various places only a little lower than where they were flushed, having wheeled round to the right and left soon after they had got on way. You cross the ravine and ascend the hill on the other side. You find it is much stiffer work than it looked, requiring a good head and a careful use of your feet. At last you get to the destined spot below bird number one, and as close as you can conveniently get thereto, it may be 20 yards or it may be 100 or more. You have a most insecure footing, and you are not quite sure that your gun going off will not remove you from it; but you mean to have a shot at that cheer, though you perish in the attempt. The shikaree climbs up still higher to flush the bird with the spaniels at his heels. After a good deal of beating of bushes and inciting of the dogs, a great fluttering is heard overhead, but it may be out of sight. The next moment a mighty rush as of some archangel, in a hurry; you spin round, let off your gun, and upset yourself, all in the twinkling of an eye; and if you get that bird, it is probably, as Mr. Hume remarks, not the first time you have shot cheer. If you do not get him, he is again marked down, probably on some lower slope of the same hill, where you may with perfect confidence leave him till you have looked up, by a similar process to that first described, the other birds originally flushed. It is curious how close these birds will sit when put up once or twice. You may

leave them half an hour and find them under the very bush you saw them pitch in; and you may beat that bush, or cause it to be beaten, till you are on the point of being convinced the bird must have gone, when up it gets almost under your very nose, and shoots with tremendous velocity down hill. This grand bird is, as I have already stated, even now very scarce in the neighbourhood of Simla, and I very much fear it will soon disappear altogether; its ways and habits laying it open to complete extinguishment more than do those of other pheasants. The rest, I think, will always be sufficiently able to take care of themselves, a wise Government now protecting them in the breeding season, in common, I believe, with all game birds of that region. I must not detain you long on the subject of the three other species of pheasants I have mentioned. As to the moonal, it is more easy for me to be brief, inasmuch as the bird is now comparatively scarce in any easily accessible part of the neighbourhood of Simla, and it is certainly by no means true now, and of that locality, whatever may have been the case when "Mountaineer" wrote (so often quoted by Mr. Hume and by Mr. Barnes), "that the most indifferent sportsman will find little difficulty in getting the moonal." This is because it has been and is so much shot for its gorgeous plumage, a small piece of which, a lady tells me, costs as much as a guinea or more at a fashionable West End bonnet shop. The man I had with me this year to skin what I shot told me he had himself skinned some 2,000 last season for one firm of exporters in Calcutta, the majority of which, I believe, came from the neighbourhood of the Chor—a hill some twenty miles (as the crow flies from Simla, but somewhat rugged and inaccessible and removed from any good road. From what little I have seen of this bird I can quite imagine that the best sport with it would be got by shooting it, as suggested by "Mountaineer," with a small rifle. Such a rifle as the .320 or .380 bore, Winchester, which Mr. Phipson is exhibiting here, and which I have lately had opportunity of proving to be a wonderfully accurate and reliable little weapon. The bird has a habit, when first flushed by dogs, of getting into a bare branch of some lofty tree, and thence abusing with great loquacity the disturbers of its peace. While so engaged, you may approach to within some 80 or 100 yards of it by using the cover of intermediate trees, and at that distance it affords a good mark for such a weapon. It is difficult to approach near enough for an effective shot with a shot gun, and the bird is so very wideawake (though "Mountaineer" somewhat

quaintly assures us that there is nothing of guile in its nature) that, when once on the wing, it seems to have a very good notion of where the guns are and how they are to be avoided. I once saw the sight that seems to have impressed "Mountaineer" so, and small wonder—a cock moonal, his peacock-erect sailing across a valley, with all his gorgeous plumage shivering and shimmering in the sun with a curious vibratory movement. A very living glittering rainbow it was: a sight that almost took your breath away. I was with a companion who did not shoot himself and would rather discourage shooting in others. I am happy to say, though, that he could play as good a knife and fork game as any of our party when a pheasant was on the table. "What on earth is that?" he said. "Why, that is a cock moonal," said I, somewhat testily, a bird he knew I very much wanted to get a specimen of. "And do you mean to say you would be brute enough to shoot that glorious thing?" he asked; and for once I almost doubted whether there might not be something in what he said. The kalij and the koklass I will dismiss with but a few words, not because there is not much to be said about them, or that they are unimportant to the Simla visitor. Quite the contrary is the case. They will form the mainstay of your larder and give you most of your sport. Both birds, if not old roosters and properly kept (you can hang them well nigh a week at that time of the year), are most excellent eating, every bit as good as an English pheasant in my opinion. And both give excellent sport. The two are found in somewhat different ground, as I have before stated, but the mode of shooting them is much the same. The guns are below and the dogs and one or two men above. The ever welcome short bark, followed by a hurried "clinking" of the frightened bird, is heard above, "Ata, Sahib," "Ata, Sahib," rings down through the trees, followed almost instantaneously by a rushing thunderbolt to your right or left, or coming straight for you out of the trees in your front; then somehow your gun goes off, and, if you are on the spot that morning, a crash is heard through the tops of the trees below you, and your faithful retriever is soon seen proudly wagging his tail with the bird in his mouth. You do not very often come across either of these birds collected together in more than twos or threes. Sometimes, however, you will be fortunate enough to light on a regular "hot corner," and have five or six down on you more rapidly than you can well load. Those are moments to live for. The joy of battle is yours. Every nerve is braced, every sense strung at

its highest pitch. You feel you are being stormed, and that you must rely solely on the keenness of your own eye and the steadiness of your pulse. Perhaps, when all is over, you smile at your own excitement: yet many things you may forget before you forget those few moments. Both these birds are amazingly quick on the wing, and almost invariably fly straight downwards; sometimes indeed a bit too straight. It is as much as you can do sometimes to avoid being knocked down by a bird you have just shot. I have had the shikaree at my side bowled over like a ninepin and rendered considerably foolish in this way. When flushed by dogs alone, both these birds will often at first, especially in the afternoons, perch on some tree, whence they will keep up their excited cackling for a considerable time. This is the moment of your shikaree's reward; you give him your gun and he stalks *ventre-à-terre* (the favourite attitude of the Duke of Wellington, according to the French books of my youth) through the trees, and pots the bird on the bough. It is wonderful what eyes these men have for a bird in a tree; they will often see them in passing without anything having occurred to cause them to expect to see a bird there, and it is almost certain that their efforts to make you also see the bird will be altogether unavailing. Many and many a long day spent on their own account with just one cunning little dog and some old "shooting iron" is, I fancy, the secret of it. On this topic, however, you will not find your shikaree prepared to be over-confidential. Nearly related to the pheasant is the red-jungle fowl (*Gallus ferrugineus*). If you keep to the higher ground, 5,000 ft. and over, you will not come across this bird; but down in some of the valleys, especially near the rivers (if you are fishing), this bird, I am told, in many places gives good sport. We come now to the partridges. In this family there is one bird at least that deserves most honorable notice. This is the chuker or red-legged partridge (*Caccabis chukor*), a very near relation of, if not identical with, our friend the "Frenchman" (*Caccabis græca*). This bird will test all your powers of walking, all your boasted accuracy of shooting, all your endurance, and all your patience. Open, broken ground in the neighbourhood of cultivation is their favourite resort, on which, while still, they are exceedingly hard to see. If they were not such arrant chatterers, they might perhaps have a comparatively great life of it. There must be an awful struggle for "the last word" amongst chukors. I fancy they must sometimes quite welcome the gun as an occasion

for changing the subject. Your shikaree takes base advantage of this little weakness of the chukor (which, however, they only indulge in early and late in the day while feeding). He sends men out to mark them down very early in the morning, while the grey snows are still asleep, and the stars are flashing their last and brightest in the clear black sky. Poor fellows, wrapped in their blankets, how cold they seem when you come up with them some hour or two later, when the sun is just touching the hill top ! Then, directed by your watchmen, you begin to look up one of the coveys they have marked down for you, working round and below the birds, and then very quietly walking them up. These birds are very strong and take a good deal of shot. They get up wonderfully smartly and are off in every direction. If you secure a right or left, you are to be congratulated. Your men all over the ground are on the look-out to mark down the birds which almost invariably separate, and often go some considerable distance before they pitch in some bush clump of grass or scrub. You must lose no time in looking up each group one by one; if you have more than one gun, the guns should separate and divide the walk, as success in making a bag of chukor depends on leaving the birds no time to regain their composure. Constant and rapid disturbance seems to make the birds a bit "mazed," as they say in Devonshire, and increases your chance. But shoot as you will, and walk as you will, probably you will not be too pleased with your performance when all is over and done, not at least while you are still a novice at chukor shooting. A chukor, I may add, is excellent eating. The only other partridge I recollect seeing on these hills is this very handsome little bird you see here—one of the wood or hill partridges (*Arboricola torquesolus*). It is essentially a forest bird. You may expect to find it where you would find the (*arboricola* or *torquesolas*) pheasant. This specimen I shot in the Bhagi forest: it was dusk, the bird was alone, and it flitted through the trees and pitched on a bare bough, some fifty yards off, in such a way that I almost thought it must be some species of owl. My shikaree told me these birds were pretty numerous in that neighbourhood, but I cannot remember having seen more than that one. Other partridges as well as quail are to be got in the lower regions of the valleys. The last game bird I will mention is our old friend the woodcock (*Scelopax rusticola*). This bird is occasionally met with near Simla as early as the end of October or beginning of November, when working for the kali

pheasant; but it is then, at any rate, decidedly scarce. I do not doubt that a few weeks later there must be a good number of them scattered about in the neighbourhood, but the forest in most places is so extensive, that the birds are hard to find. In the not very distant Kulu Valley, I have been told on the best authority that the woodcock shooting in the winter is first-rate. Such then is the sport you may expect to find in a ramble round about Simla. If time had allowed, I should like to have said something as to the delights there prepared for the artist and the botanist. Without being exactly either, your daily ramble is a continual feast to the eye. You are gladdened by the red and golden autumn tints of the chestnut, the walnut, the wild pear, and wild cherry; the deep dark green of the deodar is here and there aflame with the scarlet virginia creeper; the soft grey of the steep crags, ever and anon breaking the monotony of the dark forest, is a perfect marvel of mosaic in purple and madder, carmine and orange—scarlet, green, and ochre. Underfoot it is well nigh in some places all fern, the maiden hair and the exquisite *parsley* fern being the most conspicuous; on the open hill sides you recognise your old friend the silver-stemmed raspberry and the bright yellow and scarlet clumps of the barberry; you stoop to pick a lingering wild strawberry beautifully powdered with white crystals of frost, or a modest white violet, or mauve marguerite; and when the day's delights are at last all over, and the last lingering flush has left the snows, you are back at your bungalow, where a roaring wood-fire awaits you, you have a good dinner of Welsh mutton (it is nearly as good) and roast pheasant, smoke the pipe of peace, muse or talk a bit over the cheerful flame, pile on the logs and tumble into bed.

AT MALTA TO AND FROM INDIA.

BY CAPT. E. F. BECHER, R. A., F. Z. S.

THE homeward and outward traveller has generally a longer or shorter stay at Malta; the popular attractions, as held out by the native tout, are the Palace, St. John's Church, Dried Monks and San Antonio Orange Gardens; but there are other attractions to any one with a leaning to Natural History. Of course, the market should be visited. Six a. m. is none too early, because many of

the birds brought in are at once plucked; every bird that flies is slaughtered, when possible, and brought to the market; and, of course, during the spring and autumn migrations these are in great variety. Any small bird is a *Beccafico*, and though I have spent some years in the Mediterranean, off and on, I yet have not a clear idea what a *Beccafico* proper is, but I believe that it is the Garden Warbler (*S. salicaria*). A curious ornithological dainty, which the Maltese are especially fond of, is a portion of the back of a hen, with the adherent well-developed ovaries.

I obtained once in the market a specimen of a Stone Curlew, and on dissection the whole of the stomach cavity was filled with one large snail (*Helix vermiculata*). This bird's gullet must have been most distensible to have got it down. Many birds are brought to market alive. Amongst others, the Yellow Wagtail (*M. flava*). This bird is easier tamed than any other bird I know. The Maltese clip their wings and keep them in their shops and kitchens in order to catch flies. One I had within five days of capture would come to me and feed out of my hand, and whenever I was skinning a bird, he would always come on to the table and catch the flies, which always, of course, were present in numbers. On one occasion he got a little tow entangled in his claws; so I had to hunt him down, catch him and disentangle it, which would have frightened any other bird, but when I put this wagtail down, he just shook himself and went on pursuing flies on my table as usual. There is a fair collection of birds in the Museum of the University. To view this all you have got to do is to walk inside the University building, which is close to the market, and ask permission from the Professor of Natural Science or any one else. There is a MS. catalogue, but some of the birds, notably a Lark or two, are incorrectly labelled. The Isabelline Nightjar (*C. aegyptius*) should not be overlooked, as only few European killed specimens are in existence.

There is also a collection of land shells there, but I forget whether the Maltese shells are separated, but I think so. The land and fresh water molluscs of the Maltese Group though small (not much above forty) are most interesting, six, viz., *H. melitensis*, Fér., *H. Spratti*, Pfeiffer, *Clausilia scalaris*, Pfeiffer, *C. mamotica*, Gulia, *Physa melitensis*, Ben., *Paludina melitensis*, Ben., being peculiar to the Group.

The characteristic fossils of the Malta formations are Echinoderms, and probably a collection can be seen here. Another object

to be looked for is a specimen of the black variety of the Common Green Lizard. The latter is common all over Malta, but on the islet of Fiffa, which is a mere rock, it is replaced by a black variety. The *raison d'être* of this black variety is not, I believe, properly ascertained: but Professor Giglioli, of Florence, writes that he has invariably found that our Common Lizard (*P. muralis*) constantly presents dark varieties *in islets adjoining small islands*. This islet of Fiffa is also a breeding place of the Manx Shear water (*P. anglorum*) and also, I believe, of *P. griseus*. When I visited it in April I only took eggs of the former, though I captured and let go again one or two of the latter. But as Fiffa is not likely to be visited by the voyager, I will say no more about it. A walk round Manoel Island is interesting, poking about at the edge of the sea. After rain some fresh water pools are left amongst the rocks; in some of them may be seen a large Entomostracan, at first sight like some bivalve swimming about: this is *Estheria melitensis*, and any observations concerning it are worth noting.

Another interesting stroll is on the rocks beyond Ricasoli. Many fossil shells and echinoderms, &c., will be seen *in situ*, and perhaps a shark's tooth or so, the Malta formation being a great repository of the latter. The Malta rocks can be divided into 4, the upper being a coral limestone and below this sand. No. 2. marl. No. 3, sandstone. No. 4, semi-crystalline limestone, but for more detail I would refer to Leith Adam's book on Malta and Spratt's Geology of Malta, which can be seen in either the Garrison or the Public Library. The great geological feature is the large fault across the island, forming the Benjemna height. A good way of occupying spare time, better than by loafing about Valetta, is to take train to Notabile and then drive to St. Paul's Bay. A very good idea of the island can thus be got. At St. Paul's Bay, just opposite the little island of Salmone is the restricted area for *Clausilia scalaris* before mentioned. This Bay is—"When it was day they knew not the land but they discovered a certain creek with a shore into which they were minded if it were possible, to thrust the ship * * * and falling into a place where two seas meet they ran the ship aground. * * *" This place is said to be the strait between Salmone and the mainland.

Books to read on a voyage are often inquired for. If before reaching Malta the History of the Knights of Malta can be read, it will add much to the interest of the place especially to those who can picture the past in the present. Just inside the Gate of St. Elmo is a small

chapel, in this chapel the Knights being driven to the last extremity and nearly all wounded, received the last Sacrament, and then went out to die, the wounded being propped up in their places. A hand-to-hand fight in the grand harbour, the combatants swimming, is an episode not likely to be repeated in modern days.

MISCELLANEOUS.

BOMBAY BUTTERFLIES.

To the Editor of the Journal of the Bombay Natural History Society.

SIR,—The following note of captures made last year may interest your entomological readers. I find on reference to my diary that between 12th August and 23rd September I had secured on Malabar and Cumballa Hills alone 50 different species of butterflies and 34 different species of moths.

On 26th August I caught in the compound of the house in which I live on Cumballa Hill, two specimens of *Danaïs dorippus*, of which Mr. Aitken writes at page 127 of the first volume of the Society's Journal, that there is only one specimen in the Society's collection, and that he has never met with it in Bombay, but believes it to be an occasional variety of *Chrysippus*; and of which Mr. Newnham writes at page 220 of the same volume that he had seen two specimens in Cutch and heard of a few more at Mandvie. I have never seen any other specimens than the two I caught, and believe with Mr. Aitken that they are merely an unusual variety of a very common species, *Danaïs Chrysippus*.

On 23rd September I caught, about half mile beyond the upper end of the Vehear Lake, a beautiful specimen of *Myrina Atymnus*, the only one I have ever seen, of which the Society appear to have no specimen, and which Drury notes as "rare" among Indian butterflies.

It may also interest some of your readers to know that during the last week in July the shy white-browed bulbul, *Ixos Luteolus*, built in a hanging basket of ferns under my porch, and laid two eggs, of which I took one. The hen continued to sit on the other, but laid no more, till unfortunately a careless passer-by struck the basket, upset the nest, and broke the egg, when the hen deserted. I never saw the cock bird about the nest after the eggs were laid.—Yours, &c.,

W. E. HART.

Cumballa Hill, Bombay, 20th March 1889.

A BIRD-CATCHING SPIDER.

WHEN Madame Merian mentioned in her "Insects of Surinam" the existence of a bird-catching spider in the Settlement, her account, though believed at the time, was discredited shortly afterwards, and her statement set down as untrustworthy and exaggerated. No spider, it was believed, either caught or preyed on birds, and experiments were tried with the arachnoid in question (*Mygale avicularia*) by Langsdorf, MacLeay and others to test the truth of her assertion and,

resulting in failure, the whole account was rather summarily set down as a fabrication, pure and simple. Later on, however, M. Moreau de Jounes, who spent many years of an observant life in Martinique, and was consequently well qualified to speak on the habits of these huge spiders, bears out Madame Merian's account, and distinctly states that "it climbs on the branches of trees to surprise the *Colibris* (humming birds) and the *Certhia flaveola*." M. Palisot de Beauvais also asserts that *M. Blondii* is known to kill and devour birds, and Percival in his account of Ceylon says the same of *M. fasciata*. That spiders of the genus *Mygale* do catch and eat birds is, I think, now pretty well acknowledged, and the following account given to me by a lady, in whom I can repose the utmost confidence, will serve as another case in point to establish this fact:—

A few years ago, a pair of martins* built their nest in the verandah of this lady's house on the Shevaroy Hills, and, as she always takes a lively interest in animate nature, she allowed the birds to remain undisturbed, and watched with keen interest the process of building and incubation. On coming out one morning, however, she was surprised to find the parent bird missing from the nest, and on looking about the verandah her eyes fell on a huge spider with the bird in its clutches. Summoning her husband to her assistance she bade him despatch it, but bird and spider were so mixed up that this was no easy matter, and the arachnoid escaped into its den in the wall. On examining the bird it was found that the skin only was left, the breast and other portions having been completely eaten up. The spider had evidently caught the bird at night (the usual hunting hours of the *Mygalidæ*), and had carried it along the rafters, a distance $2\frac{1}{2}$ yards, to the entrance to its abode and there eaten it. The spider in question, from the description given of it, must have been *M. fasciata*, a species not unknown on the Shevaroyes.

A. W. MORRIS.

ENGLISH NOMENCLATURE FOR INDIAN BUTTERFLIES.

To the Editor of the Journal of the Bombay Natural History Society.

SIR,—It must have struck many people, besides myself, as very strange that we have as yet no English name for our Indian butterflies, except, perhaps, a very few for insects resembling English ones. In England the majority of common butterflies have one, if not more popular names, more or less appropriate, and some even poetical and beautiful. These names are principally derived from some striking feature in their appearance or peculiarity of habit. Surely our Indian butterflies are not so devoid of peculiarities that our ingenuity cannot supply them with some simpler, more expressive names than long, double barrel Latin ones, which convey nothing of the insect's appearance or habits. I think, if anything, our Indian butterflies possess a much more varied life history and distinguishing peculiarities. Another useful point to be gained also would be that we should learn

* Judging from the birds that have now built in the same spot these must have been *C. concolor*.

a great deal more about the life history of butterflies, as many keen observers of nature would send notes and observations, who now omit to do so, as, not knowing the scientific name, they are at a loss to distinguish the butterfly of which they wish to speak.

What I would suggest then, is that various well known lepidopterists should be written to with a request to send a list of suggested names to be laid before a Committee of our Society, who would accept the ones which seemed to them the most appropriate. A list of names so selected might then be printed and circulated for information to various Natural History Societies.

Of course, I do not for an instant suppose that these names will be accepted generally at once, or that it is an easy matter to name such a mass of butterflies; but at any rate it would be a beginning, and I think our Society might fairly claim to have done good service in the cause of Indian entomology if we caused a standard list of English names to be published.

A. NEWNHAM,
Bombay S. C.

Poona, 23rd March 1889.

PROCEEDINGS OF THE SOCIETY.

PROCEEDINGS OF THE MEETING HELD ON 16TH JANUARY 1888.

The usual monthly meeting of the members of this Society was held on Wednesday the 16th January, Dr. D. MacDonald presiding:—

The following new members were elected:—Mr. Srimant Hanmantrao Gopalrao (Sai Lashkar Saheb Bahadur), Dr. Eduljee Nusserwanjee, Captain J. F. C. Thatcher, Mr. E. C. S. Baker, Mr. C. F. Elliott, Mr. Ed. Wimbridge, Mr. Cursetjee N. Servai, Mr. H. L. Harvey, C.S., Lord Colin Campbell, Mr. P. B. Wilson, Mr. R. N. Mant, and Colonel Merriman.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections:—

CONTRIBUTIONS DURING DECEMBER.

Contribution.	Description.	Contributor.
1 Lizard	<i>Hemidactylus sykesii</i> ...	Mr. E. H. Aitken.
A Porcupine's Skull	<i>Hystrix leucura</i>	Mrs. Scott.
1 Snake	<i>Passerita mycterizans</i> ...	General LaTouche.
1 Snake	<i>Typhlops porreotus</i>	Mr. B. F. Farnham.
An Elephant's Skull	<i>Elephas indicus</i>	Mr. T. Drewett.
A Lion Monkey	<i>Macacus silenus</i>	Mr. Cowasji D. Limji.
A purple-capped Lory (alive)	<i>Psittacus domicella</i>	Mrs. M. C. Turner.
1 Starred Tortoise (alive) .	<i>Testudo elegans</i>	Mr. H. E. James, C.S.
1 Mongoose (alive)	<i>Herpestes griseus</i>	Mr. H. R. Cobbold.
Several Birds' Skulls	From Khandalla	Mr. F. Prideaux.

Minor Contributions.—From Captain Shopland, Mr. M. P. Misquita, Mr. E. Beynon, and Mr. W. R. Hamilton.

CONTRIBUTIONS TO THE LIBRARY.

Journal of the Asiatic Society of Bengal, in exchange. Proceedings of the Royal Society of Victoria, Vol. I., Part I., in exchange. Proceedings of the Linnæan Society of the New South Wales, Vol. III., Parts II. and III., in exchange.

Mr. J. D. Inverarity exhibited three very fine heads which he had lately received from Nova Scotia, *viz.*:—A moose (*Alces malchis*), a wapiti (*Cervus canadensis*), and a Rocky Mountain sheep (*Ovis montana*).

Mr. Tytler exhibited a picture of "a tiger's head" (life size), replicas of which were to be had for Rs. 100 each.

The Honorary Secretary also drew attention of the members to the "Shikari Bed." This bed, which weighs only 20 lbs. complete, was exhibited by Mr. John Wallace, C. E. Similar ones to be obtained at Rs. 25 each, on application to the Clerk at the Rooms of the Society. Mr. J. C. Anderson exhibited a collection of birds from Simla, which were greatly admired and afforded valuable illustration to his interesting paper on "Sporting Rambles round about Simla."

PROCEEDINGS OF THE MEETING HELD ON 19TH FEBRUARY 1889.

The usual monthly meeting of the members of this Society took place on Tuesday, the 19th February, Dr. G. A. Maconachie presiding.

The following new members were elected:—Mr. F. A. Spencer, Mr. Stanley Tyler, Mr. G. C. Gilder, Mr. Max Denso, Mr. A. Taylor, Mr. A. Abercrombie, Mr. Douglas Bennett, and Mr. T. D. Little.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections:—

CONTRIBUTIONS DURING JANUARY.

Contribution.	Description.	Contributor.
1 Jungle Fowl	<i>Gallus sonnerati</i>	Mr. A. Taylor.
A quantity of specimens of Quartz Crystals from Parcel.	Mr. H. W. Barrow.
1 Indian Barn Owl	<i>Strix javanica</i>	Mr. J. Spinner.
A quantity of Shells	From Karwar	Mr. Leckie.
1 Young Jackal (alive) ...	<i>Canis aureus</i>	Mr. Louis P. Russell.
2 pairs Jungle Fowl (alive)	<i>Gallus sonnerati</i>	Mr. N. S. Symons.
1 Snake	<i>Lycodon aulicus</i>	Mr. F. Kirby.
1 Victoria Crown Pigeon ...	<i>Goura victoriae</i>	Victoria Ga dens.
1 Pelican	<i>Pelecanus crispus</i>	Do.
A number of Insects	From Smbulpore	Mr. Mitchell.
66 Birds' Skins	From the Punjab	Mr. E. V. Buck.
1 Snake	<i>Passerita mycterizans</i> ...	Mr. Alex. McKenzie.
1 Snake (alive)	<i>Tropidonotus plumbicolor</i> ..	Mr. H. Littledale.
1 Indian Barn Owl (alive) .	<i>Strix javanica</i>	Mr. E. Wimbridge.
1 Jungle Fowl	<i>Gallus sonnerati</i>	Lieut. A. F. Pinhey.
1 Avocet	<i>Recurvirostra avocetta</i> ...	Mr. J. D. Inverarity.
A Porpoise (alive)	<i>Neomeris karachiensis</i> ...	Mr. W. F. Sinclair, C.S.
2 Greenshanks	<i>Tottanus glottis</i>	Mr. F. Otto.
1 Sealey Ant Eater (alive).	<i>Manis pentadactyla</i> ...	Purchased.

Minor Contributions.—From Mr. G. C. Gilder, Mr. F. Southwell Piper, Mr. G. McMullen.

The Honorary Secretary drew the attention of the members present, to an offer which had been made to the Society by Mr. Prevost of five live tiger cubs, but which it was impossible to accept.

CONTRIBUTIONS TO THE LIBRARY.

- "British Museum Catalogue of Birds," Vols. I. to XII., Captain Becher, R.A.
- "Sagacity and Morality of Plants" (Taylor), Captain Becher, R.A.
- "Records of the Geological Survey of India," Vol. XXI.. Part 4, in exchange.
- "The Indian Forester," Vol. XV., Parts 1 and 2, in exchange.

EXHIBITS.

Mr. E. L. Barton and Mr. S. Tytler exhibited a number of heads of sambar, wild boar, cheetah, and jackal mounted by them. The Honorary Secretary stated that the staff of taxidermists had been increased, so that the Society was now in a position to undertake more work of this character than hitherto.

Captain E. F. Becher, R. A., exhibited a photograph of a black buck, with curiously deformed horns, the result of emasculation.

THE SOCIETY'S PRIZE.

The Honorary Secretary stated that the prize of Rs. 100 offered by the Natural History Society for the best animal painting at the Art Society's Exhibition had been eagerly competed for, and had produced a number of interesting pictures. The prize had been awarded by the Judges to Mrs. Scott, for an excellent study of camels.

It was proposed and carried unanimously, that the congratulations of the Society be conveyed to Mrs. Scott for her success in winning the Society's prize.

THE ACCOUNTS FOR 1888.

Mr. A. Leslie, the Honorary Treasurer, then read a statement of the Society's finances for last year, showing an income of Rs. 7,078. The accounts were duly passed, subject to the audit of Mr. John Wallace, C. E.

FACILITY FOR LANDING SPECIMENS.

Mr. W. F. Sinclair, C.S., stated that, as the Society had experienced considerable difficulty in landing specimens of fish—porpoises, turtles, &c., addressed to them—at the Apollo Bunder, he begged to propose the following resolution:—"That whereas there are occasionally delays and difficulties about landing fish and other things for this Society, the Committee should instruct the Honorary Secretary to address the Port Trust with a view to obtaining permission to land at the Apollo Bunder any articles plainly addressed to the Society at its Rooms, 6, Apollo Street."

Mr. Sinclair then read a very interesting paper, entitled "A Creek of the Konkan," containing a graphic description of the birds and animals seen in the estuaries and creeks of that part of the country.

PROCEEDINGS OF THE MEETING HELD ON 5TH MARCH 1889.

The usual monthly meeting of the Bombay Natural History Society was held at the Society's Rooms on the 5th March 1889, when Mr. R. Gilbert drew the attention of the members to the recent rules issued by the Chief Commissioner of the Central Provinces relating to shooting and fishing in the reserved forests of that part of India.

Mr. J. D. Invernarity presided, and there was a very large attendance of members, those present including Mr. W. Leo-Warner, the Hon. Mr. Justice Parsons, Mr. C. P. Cooper, Captain Olivier, Mr. E. L. Barton, Dr. Banks, Dr. Weir, Dr. D. MacDonald, Mr. J. Jefferson, Mr. J. D. Steel, Mr. L. P. Russell, Mr. F. L. Charles, C.S., Mr. Reginald Gilbert, Mr. M. C. Turner, Colonel Major, and Mr. H. M. Phipson, the Honorary Secretary.

The Secretary having read the notice convening the meeting, Mr. Gilbert, at the request of the Chairman, read the rules issued by the Chief Commissioner, which are as following:—

NOTIFICATION.

The 29th November 1888.

No. 6923.—The Chief Commissioner is pleased, under Section 15 (i) of Act VII. of 1878 (The Indian Forest Act), to prescribe the following rules to be in force in all "Reserved Forests" in the Central Provinces:—

- I. The poisoning of water for any purpose whatever is prohibited.
- II.
 1. Hunting, shooting, fishing or setting of traps or snares is prohibited except with the permission in writing of the Deputy Commissioner or a Forest Officer duly authorised by him or by the Conservator of Forests in this behalf, and specifying the particular forest or forests to which the permission applies, and the period for which it is current.
 2. The permit may either be general or may restrict the holder to the hunting or shooting or trapping or snaring of particular species, or may prohibit the hunting or shooting or trapping or snaring of any particular species.
 3. The permit shall specifically prohibit the destruction or capture of animals of any species in respect of which the Chief Commissioner has directed the observance of a close season, during the term of such close season.
 4. The permit may impose restrictions upon the choice of camping grounds within the forests, and shall in all cases specify the number of companions, retainers, followers, and animals which the holder of the permit may take with him into the forest.
 5. Any permit granted under this rule shall be liable at any time to be cancelled by order of the officer granting it or of the Conservator of Forests, and shall cease to be valid in the event of fire occurring in the forest to which it applies.
 6. Forest Officers of and above the rank of Sub-Assistant Conservator of Forests are exempted from the operation of this rule within the limits of their respective charges.
- III. Any breach of the Forest Act or of any rules made under that Act by the holder of a permit granted under Rule II., or by his retainers, shall entail forfeiture of such permit.
- IV. Nothing in these rules shall exempt the holder of a permit granted under Rule II. from liability under the Forest Act, or any other law, for anything done in contravention of such law, or for any damage caused by him or his retainers.
- V. The fees to be charged for the permit issued under Rule II. shall be as follows:—
 1. A fee of one rupee per diem for each sportsman or shikari follower entering the Reserve.

2. A fee of eight annas per diem for each elephant or camel entering the Reserve.
3. When the permit authorises a camp to be formed within the limits of a Reserve, the pay and allowances of a forest subordinate to be deputed to attend the camp.

F. C. ANDERSON,

Offg. Secy. to the Chief Commsr., Central Provinces.

Note.—The Deputy Commissioner is a Forest Officer for the purpose of this rule.

Mr. Gilbert then addressed the meeting. Having prefaced his remarks by observing that the rules were supplied to him directly he had applied for them, Mr. Gilbert said the part of the rules to which he chiefly objected was that relating to the payment of a fee of one rupee per day for each sportsman or *shikari* follower entering the reserve. There might be a difference of opinion as to what constituted a *shikari* follower, but he had communicated with one or two gentlemen in the Central Provinces, and they had stated that the definition applied to a common beater. This was very hard, and if the rules were strictly construed, he thought nearly every one would be unable to shoot in the Central Provinces. Of course, if sportsmen employed elephants, then they should pay a fee, for such animals did much harm to forests; but he quite failed to see why they should have to pay such fees for common beaters. He found on reference to Sir William Hunter's *Gazetteer of India* that the area of the Central Provinces was 113,279 square miles, and of this 17,131 square miles were unreserved forest, while 2,533 miles were reserved forest. The extent of the reserved forest land was constantly being added to by Government, and he had no doubt that since Sir William Hunter's book was written, it had increased by many thousands of miles. When he (Mr. Gilbert) was at Assirgurh last Christmas, he met a Forest Officer just at the edge of the jungle and was told that these rules were in force, but he did not say anything about the fees. He thought a great deal might be said in favour of having no rules whatever. But if, with reference to reserved forests, Government chose to have rules, he did not think sportsmen could reasonably object, provided permission could be easily obtained, and provided that the necessary licence was not arbitrarily withheld by those persons who had the benefit of the shooting in the districts for which application for licences was made. The power given to the District Officer was very great, but, so far as the Forest Officers were concerned, he had invariably received great assistance from them while out shooting, and he did not believe they would be unnecessarily arbitrary in dealing with the applications for licences. But still there was nothing said about an appeal to anybody if such licences were refused, and if a District Officer refused permission, there was no remedy whatever for the sportsman. In all the circumstances he would suggest that those present should form themselves into a Committee which should be authorised to draw up a petition on the subject for presentation to the Viceroy, asking that some or all of the rules should be withdrawn; further, that the Chairman should be authorised to sign the petition on behalf of the members.

Mr. W. Lee-Warner asked Mr. Gilbert if he knew for what object the rules had been issued. Was it to protect the forests from fire, or for the purpose of making a revenue?

Mr. Gilbert replied that he had not been able to ascertain the object with which the rules had been framed, but should imagine that they were issued partly for the protection of the forests and partly for the protection of game. They could not be

solely for the protection of the forests, because in the rains there would be no danger as far as fire was concerned. Sportsmen who went out shooting were not likely to fire the forests. They had heard of instances of sportsmen lighting fires to get out of the way of animals, but the instances were far from numerous. The speaker also mentioned that he had in his individual capacity sent in a memorial to the Chief Commissioner, but it had not been replied to.

The Chairman observed that he did not think they had sufficient information at the present moment to justify them in taking any decided action in the matter. In his opinion all that they could do was to appoint a Committee to collect information on the subject, which could be submitted at a future meeting. He did not believe that the rules were framed for the purpose of protecting the forests from fire, because ample provision for such protection was made in the Forest Act VII. of 1878. In that Act there appeared to be three kinds of forests over which the Government exercised a certain amount of protection—namely, reserved forests, village forests, and protected forests—and he understood that the rules only applied to the first of these—reserved forests. He knew from experience that one could go through a vast tract of country in the Central Provinces without coming upon a reserved forest at all, but he believed that of late years—and this was a matter which they should inquire into—the policy of Government had been in the direction of turning large tracts of country into reserved forests, and probably a great many of these tracts had never even been placed under the category of protected forests. One of the first things they should do was to ascertain from the proper officials what particular forests in the Central Provinces had been declared to be reserved forests. His experience was that one always had to get leave to go into reserved forest, and from Section 25 of Act VII. of 1878 it was obvious that such permission must be obtained and it was also laid down that sportsmen should not allow cattle to trespass into the forests, that they could not take a horse into a reserved forest without permission, and that they were not to kindle or carry any fire except such as might be notified by the officer in charge of the forest. He could not therefore think that the rules were framed with the object of protecting the forests from fire, because this protection was already provided for, it being laid down that anybody lighting a fire so as to endanger a forest rendered himself liable to six months' imprisonment. What he objected in the rules was that they contemplated that one should not enter a forest at all, although his camp might be miles away from it, unless permission was obtained beforehand. The rules made it necessary that one should specify the exact time that he was going to enter the forest and the exact number of *shikari* followers that were going with him, while details also had to be given of every man, woman, and child who might be connected with the camp. This was impossible for any one to do. It was absolutely impossible for anybody at the commencement of a shooting trip to say how many *shikaris* should attach themselves to his camp. It was, in his opinion, good policy not to discourage any *shikari*, and he himself never dreamed of turning one of them away. If fees were to be charged, the rules should be so framed that they should be payable at the end of the trip, when one was in a position to give a proper return of the number of followers who had accompanied him. The rules, as they stood at present, seemed to lay it down that they were all dishonest, and accordingly they must pay the fees in advance. He did not see the necessity for fees at all. Of course, they would be to the advantage of rich men, because they would tend to lessen the shooting in the jungle: but for the great mass of sportsmen who had not succeeded in shaking the Pagoda tree, the fees were absolutely prohibi-

tive, and some of them would have to give up shooting entirely if the rules were enforced. However, he did not think that they should attribute the framing of the rules to any desire on the part of forest officials to keep the shooting for themselves. It was only natural that the men in charge of the forests should like to get as much shooting as possible, but at the same time he might say that his experience taught him that the forest officials were "remarkably good fellows." Again, he did not believe the rules were framed to raise a revenue, because although the fees would fall heavily upon the individuals who had to pay them, the aggregate amount realised would be comparatively trifling. As a matter of fact, better shooting was obtained in the jungle, but it often happened that while a sportsman was shooting on the borders of a reserved forest the animal went into the forest itself: and under the present rule, if such a thing happened, the sportsman would have to abandon his pursuit, unless he had previously obtained permission to enter that particular forest, and it was very unlikely that he would be in the possession of such a permit. He certainly objected to being bound to give such minute details when applying for permission to enter a reserved forest, and he would say further that if permission was given at all, it should be given without the payment of any fees at all. As for having a Forest Officer in one's camp to "dry nurse" one, he should object, because if he was a friend of the officer in charge of the forest, he would consider he was doing his master a good turn by thwarting the efforts of the sportsman. In conclusion, he thought they should appoint a Committee to get information as to the particular forests to which the rules applied, and also as the reason why they were framed, and then they should consider whether the Chief Commissioner of the Central Provinces had power to levy fees for permission to enter the forests. He did not find any express power given to the Commissioner to make any rules with reference to reserved forests. The only provision made in the Act was for the punishment of persons who acted in contravention of any rules the Local Government might from time to time prescribe with reference to hunting, shooting, and fishing. There was, however, another section—31—in the Act which enabled the Local Government to make rules to regulate hunting, shooting, and fishing; but this applied only to protected forests. He might also point out that it had been ruled in more than one court, that where power to regulate was given, it did not mean power to prohibit. The Committee must first get accurate information, and then it might be considered if the legality of the rules could be questioned. If it could be questioned, the members would question it. If not, then they must take all possible steps to prevent the rules operating harshly upon the large number of sportsmen, who already found the ordinary expenses of shooting quite heavy enough for their pockets.

Colonel Major suggested that application might be made to have the rules held in suspension till the present season was over.

The Chairman thought that Colonel Major might submit a resolution to that effect.

Mr. Gilbert: Then you are not in favour of drawing up a memorial at present?

The Chairman: I do not think we have sufficient material to enable us to do so.

Mr. Gilbert: The Committee can get the material and then draw up the memorial.

The Chairman: I think we may empower the Committee to take such steps as they deem desirable after they secure the information.

Mr. Lee-Warner then moved the following resolution:—"That the Chief Commissioner be informed that the recent regulations for sport in the forests of the Central Provinces have been considered by this Society, and that he be invited to

suspend the operation of them for the present season with a view of further consideration of their details: at the same time he be invited to acquaint the Society with the principal objects with which the rules are framed, in order that the Society may co-operate to effect the policy of preserving the forests and the game which he has in view, without incurring the risk which they fear that the regulations in their present form involve of prohibiting all sport." Mr. Lee-Warner remarked that, although there were more important forests in Bombay than in the Central Provinces Government had not found it necessary to issue any such rules as had been issued by the Chief Commissioner. Some time since rules were made in the Kolhapore State to the effect that no one should enter the forests without permission, and they operated most injuriously, for when sportsmen were shooting in the jungles adjoining Kolhapore, they found themselves pulled up while following their animal by the village officers, who asked, "Where is your permission?" while the patels and other officers thought it necessary to throw every obstacle in their way. On it being represented to the Kolhapore State that the British Government imposed no rules, the authorities there at once withdrew their rules, and now they would always give permission to enter the forests.

Colonel Major seconded the resolution, and it was carried.

The Chairman next proposed. "That the Secretary of the Society be instructed to communicate this resolution to the Chief Commissioner, Central Provinces."

This was seconded by Mr. L. P. Russell and adopted.

Mr. Gilbert moved, "That on the receipt of a communication from the Chief Commissioner, the Secretary be authorised to call another meeting of the Society in order that the same may be considered, with a view, if necessary, to further action being taken in the matter."

Captain Olivier having seconded the motion, it was agreed to.

The Honorary Secretary here stated that he had received letters on the subject from a large number of gentlemen residing up country, including Colonel Coles, Captain Richardson, Mr. J. Davidson, C.S., Mr. Robert Wroughton, Captain Peckler, R.A., Captain T. Macpherson, and General Anderson. These letters, he intimated, would be carefully considered by the Sub-Committee when appointed.

The proceedings then terminated with a vote of thanks to the Chairman.

An adjourned general meeting of the members of the Bombay Natural History Society was held on the 29th March 1889 at their Rooms in Apollo Street, Fort, for the purpose of considering a letter received from the Chief Commissioner of the Central Provinces, in reply to the Society's communication to sport in the Central Provinces.

Mr. Inverarity, who presided, called upon Mr. H. M. Phipson, the Honorary Secretary, to read the following letter received from Mr. Laurie, the Secretary to the Chief Commissioner of the Central Provinces, which letter was also accompanied by a list of rules framed for the protection of game in the above districts.

Camp, 23rd of March 1889.

THE HONORARY SECRETARY, Bombay Natural History Society.

SIR,—I am directed to acknowledge receipt of your letter of the 7th instant, with its enclosure, regarding the rules recently laid down by the Chief Commissioner for regulating hunting, shooting, fishing, &c., in the reserved forests of the Central Provinces.

2. The Chief Commissioner observes from the report of the discussion at the meeting of the Society on the 5th March, which you have forwarded for his information, that the main objection taken to the rules was the supposed incidence of the scale of fees. It had already come to Mr. Mackenzie's notice that there was misunderstanding upon this point; and as it never was his intention to throw unnecessary difficulties in the way of *bona fide* sport, he had, before your letter reached him, directed the preparation of an addendum to the rules as originally issued providing for the levy of reasonable fees upon term permits, and making it clear that beaters and camp followers did not come within the purview of the rules. These additional rules were published in the *Central Provinces' Gazette* of the 9th March, and I am to refer your Society to notification 1595 of that date. (Copy enclosed.)

3. This practically disposes of the difficulty raised at the meeting of your Society; but as the members are anxious to know the principal objects with which the rules have been framed, I am to communicate the following remarks for their information:—

4. The forests of the Central Provinces are, generally speaking, in a very backward and unsatisfactory condition. They have been seriously injured by indiscriminate felling during many generations, and require the most careful treatment and conservancy to restore them to anything like a healthy state. The efforts of the department to foster natural reproduction are, however, constantly frustrated by the occurrence of extensive fires, which are frequently no doubt kindled and spread by local graziers with a view to clearing the ground for fresh grass, but are ruinous to the young forest growth. Large sums are now spent annually on measures of fire protection in the more valuable blocks; and as funds become available and the local establishments are organized, the fire protected area will be year by year extended. The Chief Commissioner has within the last two years taken steps to impress upon owners of land near the Government forests their responsibility under the law for doing nothing to carry the risk of fire into or near the forests. But his efforts in this direction and the work of the forest establishments have frequently been frustrated by the breaking out of fires within the forest blocks themselves; and it is a fact that these fires have in more than one instance been coincident both as to time and place with the movements of shooting parties within the reserves. It may be that the sportsmen or their followers were not directly responsible for the mischief done, though a partially extinguished camp fire, or even the careless throwing away of a match or the end of a lighted cheroot, would, in these extremely dry districts, be enough to start a smouldering, which the least wind would fan into a fire beyond all human control. But the fact remains that if fire protective measures are to have any effect, the more valuable blocks must at certain seasons be absolutely closed to outsiders, or admission must only be granted under close supervision and suitable restrictions. There are, however, thousands of square miles of reserves to which in their present state sportsmen may be admitted more freely; but experience has shown that it is everywhere desirable to know what persons are worrying about the forests at any given time, and this knowledge can only be secured by a system of permits.

5. I am to remind the Society that it is not only gentlemen of the status of its members who seek to exploit the game of the Central Provinces forests. They are infested by gangs of native shikarees from all parts of India, whom it is at present impossible to trace and identify in the event of enquiry being necessary regarding any of their proceedings. Government rules cannot discriminate between sportsmen of different nationalities or grades of society.

6. To the fees in themselves the Chief Commissioner attaches comparatively little importance. They constitute, however, a useful and simple check upon the entry of persons of a class which it is most difficult to control, while they are not so heavy as to be a serious tax upon any respectable sportsman, European or native. As to the right of Government to levy fees for permission to shoot in its forests, there can hardly be any serious question, if it is remembered that a reserved forest is merely permanent Government estate, in and over which all outside rights and easements have been extinguished or commuted by process of law, the whole produce of which (as forest produce is defined in the Act) is Government property, and trespass in which, if access is forbidden, is a punishable offence. Government already lets its fisheries, and the right to collect horns and hides. It has a perfectly indefeasible right, in the Chief Commissioner's opinion, to close any forest block to outsiders, or to say that it will admit them on any terms, pecuniary or other, which it chooses to prescribe. Nearly all the Government forests of the Central Provinces were declared reserves shortly after the passing of Act VII. of 1878, and if large areas have hitherto been practically neglected, this has been due only to the weakness of the establishments and the impossibility of extending a strict conservancy to the whole or even any very great portion of them all at once.

7. But the rules have other objects besides the prevention of fires. As above explained, the forests of these provinces have for years been freely exploited by large numbers of native shikarees for trade purposes. Birds have been shot and snared for their feathers. The hinds, does, cows, and young of harmless game have been destroyed ruthlessly for their skins. Men of the class observe no close season, and numerous interesting and valuable species are now on the verge of extinction. The Chief Commissioner hopes by the system of permits in course of trial, and as experience is gained, to do something to check this and put matters on a better footing. This, he feels sure, is an object in which he will carry with him the sympathy of the Bombay Natural History and of all true sportsmen. If the Society would communicate to him any information at its disposal regarding the proper close season of the different species of birds and game known in the province, he would welcome it. He finds much discrepancy and doubt existing on this question.

8. For the rest, the Conservator has been instructed to work the rules in a reasonable and liberal spirit, with due regard to the primary object which they have in view. Special facilities for the destruction of dangerous carnivora will be afforded as far as possible. Any temperate representations regarding the operation of the rules in individual cases or generally will always receive the Chief Commissioner's early attention. But as this year the province is suffering from a continued drought, and the forests are in a specially dangerous condition, Mr. Mackenzie must decline to suspend the operation of the rules as suggested by the Society. Any delay in giving effect to them might involve serious consequences. He is responsible to the Government of India for his management of the forests, and he must adopt on his own responsibility, and subject only to the control of the Governor General in Council, such measures as appear to him called for in the public interest. He can share that responsibility with no non-official person or society, though he is always ready to accept information and suggestions from such a body as you represent.

9. The only other point which it is perhaps desirable to notice is the exemption of Forest Officers from the necessity of taking out permits. The Chief Commissioner would have supposed the reasonableness of this would have been self-evident, but one of your members, he observes, takes exception to it in a letter to the *Bombay Gazette*

The officers whose duty it is to protect the forest and decide on the grants of permit to outsiders (including all other Government officers from the Chief Commissioner downwards) could hardly be called upon to issue permits to themselves. The Deputy Commissioner is in these Provinces, owing to the paucity of the trained staff, in charge of large areas of the district forests, and can fairly claim exemption as himself a Forest Officer. No other exemption in favour of officials is permitted. Any Forest Officer found protecting or preserving the shooting in a forest for his own purposes would, the Society may be sure, be very severely dealt with.

I am, &c.,

L. K. LAURIE,

Offg. Secretary to the Chief Commissioner, C. P.

Mr. Gilbert considered that as the Chief Commissioner had expressed willingness to listen to any suggestions the Society was prepared to make, it would be advisable to appoint a Committee of the members to reply to it. He should personally like to make a few suggestions, and he had also a number of letters from friends which contained suggestions, that he considered might be submitted to the Commissioner.

Mr. Inverarity, on the other hand, considered that as the letter they had received contained a very satisfactory reply to their communication, it was not advisable to make any suggestions, as the scale of charges was, as modified, moderate enough to satisfy any true sportsman, and should not raise any complaint, for, as far as he could see, the rules would prevent what he called the "native pothunters" from shooting anything they met. He, furthermore, understood from the letter that it was simply intended to enclose certain areas in order to protect them from fire. He believed that was always done, and as the areas so enclosed were not very large, he did not think it would much matter. For, as far as the Society was concerned, he did not think they had much ground for complaint, as the rules would tend to the protection of game and the expulsion from the shooting ground of that class of native shikar who shot indiscriminately at small game and over water, regardless of a proper close season. He considered such shooting should be prohibited during the hot months. He did not see how the Society could make any suggestions to the Commissioner regarding the working of the rules for they had done all that was necessary in the matter. He therefore suggested that the Secretary of the Society be instructed to reply to the Commissioner's letter, thanking him for the courteous answer he had given to the Society's communication, and expressing their gratification that the Chief Commissioner's rules are not intended to restrict sport in the Central Provinces.

This proposition, on being seconded by Mr. Taylor, was carried *nem con.*, the proceedings concluding with the customary compliment to the Chairman.

No. 1505.—The Chief Commissioner is pleased, under Section 25 (i) of Act VII. of 1878 (the Indian Forest Act), to add the following Rules to those published in Notification No. 6925, dated the 29th November 1888.

VI.—Permits for shooting only may be granted at the periodic rates specified below, instead of at the daily rates payable under Rule V :—

Period.	Periodic rates.		
	For each sportsman or shikari follower.	For each elephant taken into the Reserved Forest.	For each camel taken into the Reserved Forest.
	Rs. a. p.	Rs. a. p.	Rs. a. p.
From the 1st July in any one year to the 31st October in the same year	5 0 0	5 0 0	5 0 0
From the 1st November in any one year to the end of February in the succeeding year	25 0 0	5 0 0	5 0 0
From the 1st March in any one year to the 30th June in the same year	50 0 0	5 0 0	5 0 0
For one month within the period from the 1st July to the 1st October as above ...	2 8 0	2 0 0	2 0
For one month within the period from the 1st November to the end of February as above	7 8 0	2 0 0	2 0
For one month within the period from 1st March to the 30th June as above	15 0 0	2 0 0	2 0 0

N. B.—(a) A charge for the pay and allowances of a Forest Subordinate, as provided by Rule V. (3), will also be made when camping in the reserves is allowed.

(b) The charge provided by Rules V. and VI. for elephants and camels will only be made in the event of camping within the Reserved Forests being allowed.

VII.—For specific purposes and in special cases permits may, with the previous sanction of the Conservator, be granted without charge.

VIII.—Nothing in the preceding rules shall debar the disposal by auction-sale, contract, or otherwise of the fishing or shooting within any Reserved Forests or portion of a Reserved Forest.

Explanations.

(a) Shikari follower in these rules means a person who is taken into the Reserves for the purpose of killing or catching game, and is not merely an attendant on the holder of the permit. The intention is that each ' effective gun ' of the party should pay the fee. Persons employed by the holder of a permit in tracking, marking down, or beating for game (where this is allowed) are not Shikari followers within the meaning of Rules V. and VI.

(b) The holder of a permit is allowed to remove from the forest any game shot by him.

(c) Shooting will not ordinarily be allowed within " fire protected forests " during the hot season.

L. K. LAURIE,
Offg. Secy. to the Chief Commr.,
Central Provinces



H. B. del. Mintern Bros. Chrome lith. London.
 84 HIRUNDO FILIFERA, Steph. Wire-tailed Swallow 86 HIRUNDO FLUVICOLA, Jerd. Indian Cliff Swallow
 90 PTYONOPROGNE CONCOLOR, Sykes. Dusky Gray Martin 107 CAPRIMULGUS INDICUS, Lath. Jungle Night Jar.
 111 CAPRIMULGUS ATRIPENNIS, Jerd. Ghat Night Jar 112 CAPRIMULGUS ASIATICUS, Lath. Common Indian Night Jar
 113 CAPRIMULGUS MAHRATTENSIS, Sykes. Sykes Night Jar 114 CAPRIMULGUS MONTICOLUS, Frankl. Franklin's Night Jar
 214 EUDYNAMIS HONORATA Linn. Indian Koel



INSTANCE OF TERATOLOGY IN THE BRINJAL OR EGG
PLANT (*Solanum Melongena*).

(Triple fruit from a Single flower.)